

The Temporal Semantics of Actions and Circumstance in Blackfoot

by

Meagan Louie

B.A., The University of British Columbia, 2007

M.A., The University of Toronto, 2008

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Abstract

In this dissertation, I look at interactions between circumstantial modals and temporality in Blackfoot. I present previously undocumented data based on original fieldwork and propose an action-dependent framework for circumstantial modality to analyze the generalisations. The generalisations include variation in the range of temporal interpretations that circumstantial modals allow, and correlated effects on the licensing and temporal interpretation of "if"-clauses. The main empirical finding is that Blackfoot's ability modal, *ohkott-*, patterns distinctly from the future modal *áak-* and the "might" modal *aahkama'p-*: while *áak-* and *aahkama'p-* behave like stative predicates in Blackfoot, allowing both past and present interpretations, *ohkott-* behaves like an eventive predicate, only allowing a past interpretation.

I propose the temporal restrictions associated with *ohkott-* are derived from an agentivity requirement on its complement. The main theoretical innovation of the dissertation is the presentation of a semantic model where this is possible: Instead of the standard approach to circumstantial modality, which involves quantification over worlds (cf. Kratzer (1977), Portner (2009)) I propose a system that involves two levels of quantification: one over actions, and one over worlds (cf. Brown (1988), Emerson & Clarke (1982), Alur et al. (2002)). The intuition behind the proposed system is that inferences about the way the world unfolds are based not only on an agent's circumstances, but also on the actions that an agent takes. Given this intuition, I propose that the way we grammatically express such inferences (i.e., circumstantial modal claims), should likewise refer to both circumstances and actions. To incorporate actions into a linguistic framework, I propose that the relationship between actions and events is parallel to the relationship between kinds and individuals (cf. Carlson (1977), Chierchia (1998)) - i.e., events are instantiations of actions. Following Belnap (1991), Horty (2001), Belnap & Perloff (1988)'s modal-temporal approach to agentivity, I further propose that agentivity be temporally modelled in terms of an action-dependency. The contrast between *ohkott-* vs *áak-* and *aahkama'p-*, can then be derived from temporal restrictions on the kinds of actions that satisfy *ohkott-*'s agentive requirement.

Preface

- The following is a list of presentations and publications in which various parts of this dissertation were first introduced.
 1. The majority of chapter 4 was presented at SULA 8 (Louie (2014)); the discussion regarding the temporal perspective of Blackfoot epistemic modals was published as part of Chen et al. (Under Reviewa) and Chen et al. (Under Reviewb).
 2. The first half of chapter 5 was published in the proceedings of CLA 2013 Louie (2013) ("Constraints on Licensing If-Clauses in Blackfoot"); previous versions of this work were presented at WSCLA 17 and NWLC 2013.
 3. The data generalisations presented in the second half of chapter 5 were presented at SULA 7; the analysis presented in this dissertation is distinct from what was presented at SULA 7, however.
 4. The majority of chapter 7 was presented at WSCLA 19. My initial interest in actuality entailments was due to being one of the many authors of Davis et al. (2010), which was published as the proceedings of SULA 5.
- This research was approved by the Behavioural Research Ethics Board, under the Ethics Certificate Number: H07-01365.

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Orthographic Conventions

This is a guide to Blackfoot orthography. For the most part, I follow the orthographic conventions presented in Frantz (1991, 2009).

Sonorant Consonants

The nasals **m** and **n** represent their IPA equivalents [m] and [n]. The symbols **y** and **w** represent the IPA symbols [j] and [w] respectively.

Obstruent Consonants

The symbol **'** represents a glottal stop. The symbols **p**, **t**, **k** represent voiceless unaspirated stops. The symbol **s** represents a voiceless alveolar fricative made with the tongue tip up. The digraph **ts** represents an alveolar affricate [tʃ] and **ks** represents a velar-alveolar affricate [kʃ]. The symbol **h** represents a voiceless fricative whose place of articulation is conditioned by the following consonant.

Vowels

The symbols **a**, **i** and **o** represent Blackfoot's three simple vowel sounds: **a** represents [a], **i** represents [i], and **o** represents [o]. Long vowels are represented by doubling the symbol - i.e., a long [o] is represented as **oo**. An accent aigu, e.g., **á**, represent pitch accent.

Certain vowel combinations combine to form diphthongs in Blackfoot. The combination of **a** and **i** combine to form **ai**, which represents the sound [ɛ]. The combination of **a** and **o** combine to form **ao**, which represents the sound [ɔ]. The combination of **o** and **i** combine to form **oi**, which represents the diphthong [oj].

The vowels described above have allophonic variants I have not discussed here. See Frantz (1991, 2009) for more details.

Allomorphy

Several more orthographic conventions from Frantz (1991, 2009) represent allomorphic processes. They are listed as follows:

A capital **M** represents a final [m] that only appears in specific morphosyntactic contexts - e.g., the verb stem *ipiiM* "enter" surfaces as *ipii* with 1st or 2nd person subjects, but surfaces as *ipiim* with a 3rd person subject.

A vowel with a colon after it, eg., **a:**, represents a "variable-length" vowel. These are long in some contexts, and short in others. The conditioning contexts are not well understood.

Glossary

Verbal Complex: Person Prefixes

- 1 1st person
- 2 2nd person
- 3 3rd person proximate
- 3' 3rd person obviative

Verbal Complex: Preverbs

- ic initial change (morphophonological process)
- PERF perfect
- IMPF imperfective
- PFV perfective
- ABLE ability modal
- FUT future
- EPIST epistemic modal
- DEON deontic modal
- N.FACT non-factive (complement clauses only)
- add additive
- c.exp counter-expectation
- RL relative root (indicates a salient time or location)
- ASSOC associative (occurs with ACCMP, a transitivizing final)
- INCH- inchoative

Verbal Complex: Verb Stems

- VAI animate (subject) intransitive verb stem
- VII inanimate (subject) intransitive verb stem
- VTI transitive inanimate (object) verb stem
- VTA transitive animate (object) verb stem
- ACCMP accompaniment (transitivizing final)
- RECIP reciprogal (detransitivizing final)

Verbal Complex: Theme, Person and Number Suffixes

- 21 1st person plural inclusive
- 1PL.EXCL 1st person plural exclusive
- X:Y X acts on Y Where X, Y = {1, 2 LOC, 3, 3', 0} and

- 1 1st person
- 2 2nd person
- LOC local person (i.e., 1st or 2nd person)
- 3 3rd person (animate) proximate
- 3' 3rd person (animate) obviative
- 0 3rd person inanimate

Verbal Complex: Clause-Type Suffixes

- UNR unreal clause type
- SBJ:X subjunctive clause type (X = {LOC, 3})
- CJ conjunctive clause type
- IMPV:X:Y imperative clause type (X={2sg, 2pl}, Y= {1sg, 1pl, 3})

Verbal Complex: Post-verbal Clitics

- DTP distinct third person pronoun
- nonaff non-affirmative pronoun

Demonstratives

- DEM demonstrative base

Demonstrative and Nominal Suffixes

- PL animate plural
- 0PL inanimate plural
- 0 inanimate singular
- 3 3rd person proximate
- 3' 3rd person obviative
- rel 'not visible to the speaker'

Font Conventions

SMALLCAPS	Grammatical category labels (e.g., SUBJUNCTIVE, PERFECTIVE, ...) Basic semantic predicates/relations (e.g., DANCE, FALL, AGENT)
boldface	Ontological elements (e.g., individuals a, b, c , truth-values, 1, 0 , times t, t₁, t₂ ...)
<i>italics</i>	Object language lexical items/phrases (e.g., <i>ihpiyi, dance</i> ,...) Emphasis/contrast (e.g., not an interval, but an <i>instant</i> ...)
“double quotes”	Translations of Blackfoot lexical items/phrases/sentences English sentence examples
BOLDFACE SMALLCAPS	Introduction of new terminology (e.g., ACTION, TEMPORAL PERSPECTIVE , ...)

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Finally, the people who have always given me the best sense of home and belongingness: Mom and Dad, thanks for everything. You've always encouraged me to do what I want, and given me the support to do it. My siblings, Kristal, Kim and Michael: people are always surprised when I mention yet-another-sibling, but I honestly can't imagine having fewer siblings. How could my life have been as full and happy if you all weren't always there making fun of me, or helping me make fun of one of you, or collectively doing things with me that Mom and Dad would later make fun of us for? Jon, Jeremy and Joanne, some of you are siblings-in-law, but all of you are siblings-in-spirit. Thanks to all of my siblings for the good times watching shows and movies, climbing the Grouse Grind, running, book discussions, crafting, baking, and occasional deep-frying that kept my life balanced these last years. My niece, Kaia: hugs from your chubby little arms uplifted me whenever I was feeling stressed, and I'm sure I'll think back fondly on the many times these past months when you would demand to sit on my lap as I worked, half of my screen devoted to my dissertation file in TeXworks, the other half devoted to your favourite YouTube video, the Sharon Lois & Bram ending theme song. The message of that song is pretty much the same message I want to express to you all here: Much love, Meagan. I was funded for my Ph.D. in part by a SSHRC Joseph-Armand Bombardier CGSD Scholarship #767-2008-2419, and a Jacobs Research Grant.

Dedication

For Beatrice Bullshields,

Whenever I felt that writing this was just getting too hard, I thought about how much harder you had already worked to gift me with your knowledge and insight. And then I knew that I couldn't let your hard work be for nothing, and that I had to keep on working, because I wanted everyone to see the fruition of all the time, effort, and caring that you've given to me.

kitsáysspommokihtopi, nimáátáaksiksistssinai'paatsiksi

Níitsiikohtaahsi'taki

Chapter 1

Introduction

"...the dominant logical template takes an agent as a wart on the skin of an action, and takes the action as a kind of event."

Belnap (1991)

Inferences about how the future may unfold are often expressed with circumstantial modal claims. Examples of these are illustrated in (1). I will refer to the elements in bold as **CIRCUMSTANTIAL MODALS**; this terminology is based on the intuition that elements like *might*, *can* and *will* add meaning to a sentence by making claims about the world's circumstances: examples (1a) and (1b) claim that Kim buying a ticket is compatible with the world's current circumstances, and (1c) claims that Kim buying a ticket is not only compatible, but rather likely, given the world's current circumstances (or something along those lines).

- (1) a. Kim **might** buy a ticket.
b. Kim **can** buy a ticket.
c. Kim **will** buy a ticket.

The main theoretical innovation in this dissertation is based on a common intuition about agency and free will. The basic idea is that the way the future unfolds depends not only on (i) the circumstances surrounding us (as described above), but also (ii) on the choices we make and the actions we take. The most common approaches in linguistics to the semantics of circumstantial modality do not take this notion of choice and actions into account. In this dissertation, I propose to incorporate a semantics for **ACTION** and **AGENCY** into the standard approach to circumstantial modality. Many circumstantial modals can then be analyzed in a way that reflects the intuition that the future (and hence the way we grammatically express our inferences about the future) depend on an individual's choices and actions. We can thus view the meaning of circumstantial claims like (1) as being dependent on three times: t_1 , the time at which we're considering Kim's **CIRCUMSTANCES**; t_2 , the time it takes Kim to undertake an **ACTION** (eg., walking to the station); and t_3 , the time at which the **PREJACENT PROPERTY** (Kim buying a ticket) holds.

As the semantics for **ACTION** and **AGENCY** that I propose are temporally-defined, the main empirical phenomena I aim to account for involve semantic interactions between circumstantial modality and temporality. The particular empirical phenomena I discuss are the result of the

author’s original fieldwork on the Blackfoot language, an endangered Algonquian language spoken in Alberta and Montana. The data and generalisations presented in this dissertation, unless otherwise indicated, are previously undocumented patterns. One of the main theoretical claims is that in Blackfoot, all three of the times associated with a circumstantial modal claim (the time of circumstance t_1 , the action time t_2 , and the preajcent time t_3) are identified as the same time (figure 7.1). This contrasts with a language like English, where the circumstance and preajcent time only correlate with the initial point of the time it takes for an agent to undertake an action (figure 1.2). I claim that the majority of the empirical generalisations that I document in the dissertation can be analyzed as consequences of this temporal correlation.

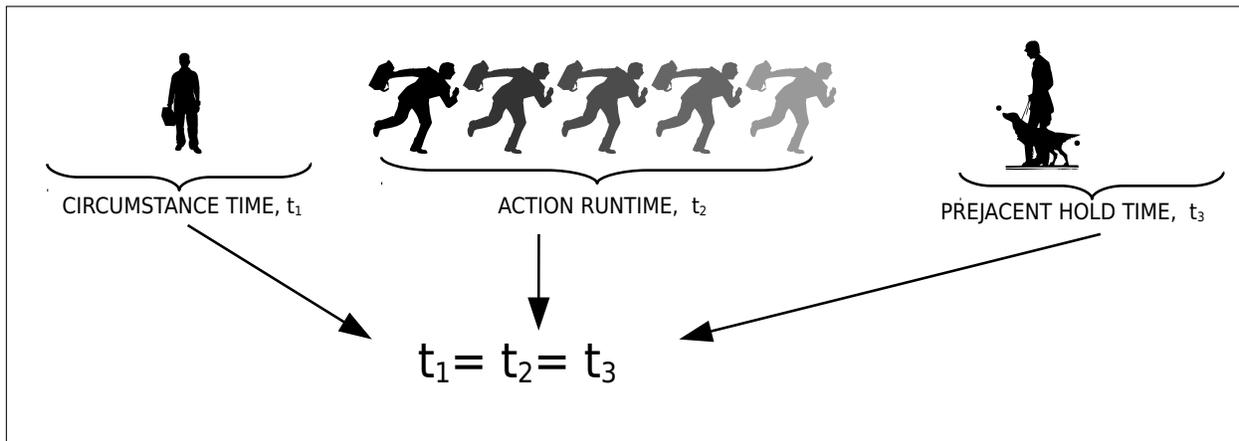


Figure 1.1: Correlation of Times for a Blackfoot Circumstantial Claim

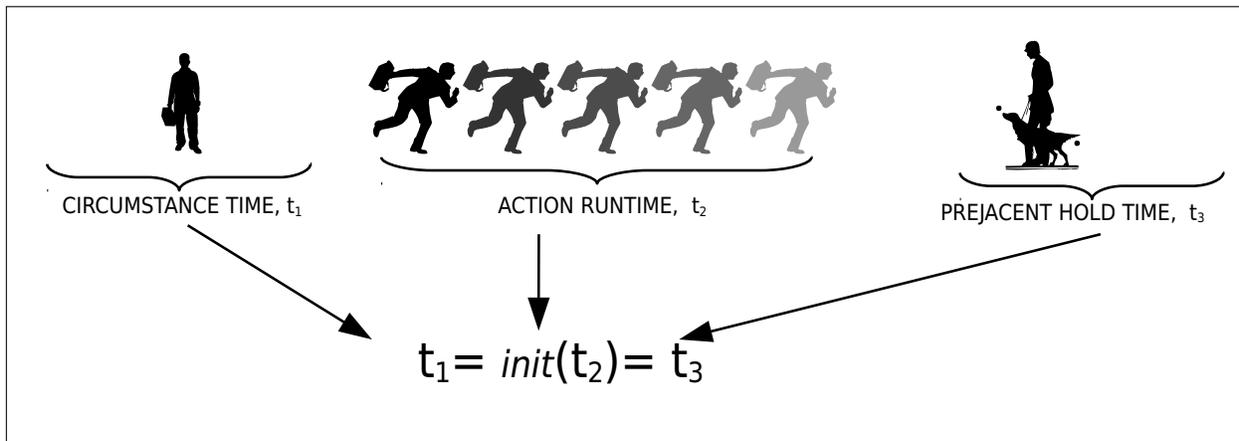


Figure 1.2: Correlation of Times for an English Circumstantial Claim

1.1 Setting the Stage

Why does this dissertation focus on interactions between temporality and circumstantial modality in Blackfoot? In other words, why are interactions between temporality and circumstantial modal-

ity interesting? And why does Blackfoot provide a particularly interesting venue for this sort of research? In this section I present my answers for these questions.

1.1.1 Circumstantial Modality and Temporality

Why Modality? Reasoning and Modality

As human beings, we are confronted with sensory information every day. A human's store of knowledge, however is not limited to this input of sensory information. A thinking individual, confronted with sensory information, can question why or how various patterns in the sensory information obtain, and can work to uncover explanations for these patterns. This act of making sense of the world around us - i.e., reasoning - is an additional means of acquiring knowledge, and a defining characteristic of human nature. It is also a key part of the scientific method; without the capacity to reason, no scientist or linguist would be able to posit the hypotheses that drive further research. Reasoning is thus an important and interesting topic for any thinking individual; it is a crucial component in the pursuit of knowledge.

As linguists, we are interested in the sorts of patterns that can be observed in language. A linguist interested in reasoning should then find modality interesting, as modality allows us to express reasoning through language. This can be illustrated with the following examples.

- (2) a. Anne's hair is green
b. Anne's hair **must** be green.
c. Anne's hair **will** be green by tomorrow.

The sentence in (2a) is a non-modal claim; it may be information that the speaker obtained either by direct sensory perception (i.e., the speaker saw Anne, and observed the aftereffects of a dye-job gone wrong), or it could also be information that the speaker obtained through reasoning (e.g., the speaker (i) knows that a particular dye will turn red hair green, and (ii) knows that Anne bought and used the dye, and from that concludes (iii) that Anne's hair is now green). In contrast, the sentences in (2b) and (2c), which are overtly marked with the modals *must* and *will*, are necessarily interpreted as information that the speaker obtained through reasoning. Neither (2b) nor (2c) can be interpreted as information garnered via direct sensory perception - (2c), for instance, cannot be learned via direct sensory perception because one cannot perceive the future (see von Stechow & Gillies (2010) regarding the infelicity of (2b) in direct perception contexts).

The way that a particular phenomenon is encoded in language is not necessarily a realistic representation of the real-world properties of the phenomenon in question (or even how humans conceptualize the phenomenon in question). However, just as a non-realistic artistic depiction of a particular subject can provide an interesting perspective on the subject of interest (see figure 1.3),

the way that language encodes modes of reasoning (i.e., modality), provides the researcher with an interesting perspective into human reasoning. This is why modality is an interesting venue of research for the linguist.

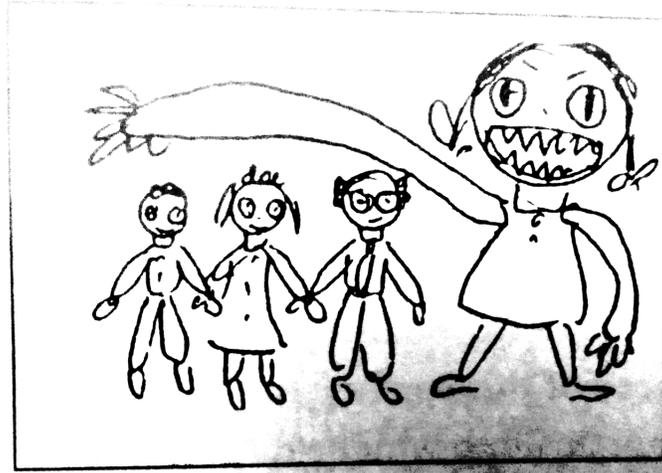


Figure 1.3: Image from Edwards (1999); A Child's Family Portrait: Himself, his Mother, his Father and his Sister.

Why Circumstantial Modality? Time-Sensitive Practical Reasoning

Circumstantial modality contrasts with epistemic modality. Whereas circumstantial modal claims are inferences about the way the world may unfold based on a given set of circumstances, epistemic modal claims are inferences about the way the world is, based on the speaker's knowledge, or evidence. So what is so interesting about *circumstantial* modality and its interactions with temporality? Why should this particular area of modality be of interest to a researcher? In the previous section, I argued that research on modality is interesting because it provides an interesting perspective on human reasoning. There are various kinds of reasoning that a human being can engage in. For instance, we can distinguish between **THEORETICAL** and **PRACTICAL** reasoning (Rips & Adler (2008)). I suggest that these kinds of reasoning differ not only in their end goal (the determination of truth/beliefs vs the determination of an individual's behaviour respectively), but also in their time-sensitivity: while the conclusions yielded via theoretical reasoning remain valid independent of the time that the reasoning takes place, the conclusions one comes to via practical reasoning are crucially time-sensitive. Because circumstantial modality and epistemic modality differ in that epistemic modality relies mainly on theoretical reasoning, but circumstantial modality relies on theoretical and the time-sensitive practical reasoning, interactions between circumstantial modality and temporality are of particular interest to a researcher interested in human reasoning.

Rips & Adler (2008) distinguish between theoretical and practical reasoning in terms of their end goals. One performs theoretical reasoning in order to determine whether or not a proposition

is true; its end goal is thus knowledge (or belief). Thus the example in (2b), repeated below with an example deduction, is an example of this kind of reasoning. The premises 1, 2 and 3 in (3) are used to determine whether or not the conclusion, 4, in (3) is true or not.

(3) **Anne's hair must be green.**

1. The black dye that the peddler sells always turns red hair green.
2. Anne has red hair.
3. Anne used that black dye on her hair.
4. ∴ Anne's hair is green.

Practical reasoning, on the other hand, is performed in order to determine how one should act. Its end goal is not to determine whether or not a particular proposition is true, but rather to determine what sort of actions an agent can, should or will take. This can be illustrated with the example below. The premises 1 and 2 in (4) lead to the conclusion in 3. The issue is not whether or not the non-modal proposition "Anne dyes her hair" is true or not, however. The issue is whether or not Anne should take the action of dyeing her hair: to act or not to act.

(4) **Anne should/can buy some hair tint and dye her hair.**

1. Anne dislikes having red hair.
2. The peddler is selling hair tint that he claims will turn any hair raven black.
3. ∴ Anne should buy some hair tint and dye her hair. (≠ Anne buys some hair tint and dyes her hair)

Practical reasoning, in contrast to theoretical reasoning, is time sensitive. This reflects the different end goals of the two types of reasoning. The end goal of theoretical reasoning is the establishment of fact, and this is insensitive to the passing of time; the result of theoretical reasoning doesn't have the potential to change the world, it only changes what a rational individual knows about the world. This is not the case for the result of practical reasoning - i.e., the determination between the various actions that an individual has open to them. The result of practical reasoning has the potential to change the world. Thus while the conclusion reached via the line of reasoning performed in (3) is valid no matter how long after the events in question the reasoning is performed - i.e., Anne's hair being green does not depend on when the theoretical reasoning is performed. The conclusion reached via the line or reasoning performed in (4), however, is time-sensitive. The action in question (to buy and dye or to not buy and dye) - i.e., the conclusion of the practical reasoning in 4) - relies on the particular circumstances at a particular time (e.g., the peddler being at the door).

The inferences expressed by epistemic modal claims like *must* in (3) rely on (time-insensitive) theoretical reasoning. The inferences expressed by circumstantial modals like those in (5), rely on both kinds of reasoning. Inferences about how things will, might or should turn out depend both on (i) the way things are (i.e., whether or not certain propositions are true), as well as (ii) how an agent chooses to act.

- (5) a. Marilla **might** cut Anne's hair.
b. Marilla **can** cut Anne's hair.
c. Marilla **will** cut Anne's hair.
d. Marilla **should** cut Anne's hair.
e. Marilla **must** cut Anne's hair.

Circumstantial modality thus involves reasoning about two very basic philosophical questions: the way the world is (theoretical reasoning), and the way agents act/behave (practical reasoning). Because practical reasoning is time-sensitive, interactions of circumstantial modality with time (as well as a language's way of encoding time - e.g., tense and aspect) are particularly interesting. For this reason, the main empirical focus of this dissertation involves three kinds of circumstantial modality in Blackfoot: (i) the future modals *áak-* "will" and *aahkama'p-* "might," (ii) the ability modal *ohkott-*, and (iii) the imperfective aspect *á-*.

1.1.2 Why Blackfoot? Blackfoot Tense and Aspect

There has been previous research on interactions between time and modality in language. However, the majority of the work in question has been based on English data. For instance, Condoravdi (2002), Ippolito (2003) and Copley (2002) all focus on English (see chapter 3 for discussion of these works). The underlying issue is not one particular to English, however - most (if not all) languages have some way of expressing circumstantial inferences of the type in (5) and of expressing notions of time. Variation in how different languages encode these systems, and how these systems interact, is thus important to investigate: the range of similarities and differences will reflect which parts of Condoravdi (2002), Ippolito (2003) and Copley (2002)'s conclusions are universal and (arguably) inherent to how human language encodes notions of time and reasoning, as well as reflecting which parts of the aforementioned conclusions are arbitrary conventions associated with the grammar of English. In this section, I explain why Blackfoot in particular provides a fertile ground for investigating these phenomena.

Blackfoot is a particularly suitable language for investigating these sorts of phenomena for two reasons. First, although Blackfoot is a relatively understudied language, the range of formal semantic research that has already been done is exactly what is required to make an investigation into modal-temporal interactions feasible. Chin (2008), Dunham (2008) and Reis Silva & Matthewson (2008) have investigated the basic patterns of lexical aspect, grammatical aspect and tense in

Blackfoot (see chapter 2 for more information on these works). Looking at how these temporal notions interact with modality is thus more feasible for a language like Blackfoot than for understudied languages where previous semantic work may either be lacking, or have concentrated in a different area of semantics.

Second, the morphosyntactic reflexes of Blackfoot tense and aspect do not appear to be tied up with its modal system, unlike in a language like English. This property of English can be illustrated in (6); while a sentence can be marked with tense like (6a), or with a modal as in (6b), a sentence cannot be marked with both tense and a modal, as shown by the ungrammaticality of (6c). Although there are modals that have the form of a past tense, like *could* in (6d), such modals do not have the standard temporal properties associated with tense; note that (6d) hypothesizes about a future, not past, possibility.

- (6) a. Diana **had** attended Avonlea school.
 b. Diana **must** have attended Avonlea school.
 c. *Diana **must had** attended Avonlea school.
 d. Diana **could** attend Avonlea school.

Is the restriction shown in (6) an issue of morphosyntactic or semantic incompatibility? In other words, is there a semantic restriction that rules out the combination of a modal with past tense, or are the meanings associated with the English past tense and modal compatible, but ruled out for morphosyntactic reasons? Are the semantic generalisations reached by the aforementioned works on English modal-temporal interactions subject to morphosyntactic confounds? Or do they actually follow from universal properties constraining how human language encode notions of reasoning? One way to shed light on these questions is to look at languages with different systems of expressing tense. Blackfoot is such a language: while it has strict patterns regarding tense interpretations, tense has no overt morphological reflex (Ritter & Wiltschko (2004), Reis Silva & Matthewson (2008)). This can be illustrated with the following examples. The unmarked stative *isttso'kini* "hungry" can be interpreted as either past or present, as shown in (7). While the unmarked eventive *ihpiyi* "dance" can only have a past interpretation, as shown in (8), its imperfective-marked form in (9), like the stative in (7), can have either a past or present interpretation. From this we can observe that neither present tense interpretations nor past tense interpretations correlate with specific pieces of morphology - i.e., past/present tense has no overt morphological reflex.

- (7) *Anna Mai'stoo isttso'kini*
 ann-wa Mai'stoo-wa isttso'kini-wa
 DEM-3 Raven-3 hungry.VAI-3
 'Mai'stoo is hungry' OR 'Mai'stoo was hungry.'
 ≠ 'Mai'stoo will be hungry'

- (8) *Anna Mai'stoo ihpiyi*
 ann-wa Mai'stoo-wa ihpiyi-wa
 DEM-3 Raven-3 dance.VAI-3
 'Mai'stoo danced.'
 ≠ 'Mai'stoo is dancing', 'Mai'stoo will dance'

- (9) *Anna Mai'stoo áihpiyi*
 ann-wa Mai'stoo-wa á-ihpiyi-wa
 DEM-3 Raven-3 IMPF-dance.VAI-3
 'Mai'stoo is dancing.' OR 'Mai'stoo was dancing.'
 ≠ 'Mai'stoo will dance'

Tense	Unmarked Eventives	Imperfective-marked Eventives	Unmarked Statives
Past	✓	✓	✓
Present	×	✓	✓

Table 1.1: The Availability of PAST and PRESENT readings (Reis Silva & Matthewson (2008))

Ritter & Wiltschko (2005, 2009) further argue that the lack of overt tense morphology correlates with tense's lack of syntactic status as a functional projection. More specifically, they argue that while Blackfoot has the functional projection IP, it is not instantiated with tense morphology the way IP in English is, but is rather instantiated with person morphology (see chapter 8 for more detail). Thus while Blackfoot sentences are systematically interpreted with respect to either a past or present tense (cf. Reis Silva & Matthewson (2008)), tense does not appear to be associated with a functional projection restricted by a notion of a universal spine. This contrasts with the null assumption of a Cinque (2002)-style cartographic approach to languages, wherein all languages have the same underlying functional structure (eg., VP, TP, CP) and each functional projection is associated with a specific kind of semantic meaning. Given Ritter & Wiltschko (2005, 2009)'s more flexible system for Blackfoot, any observed restrictions on modal-temporal constructions in Blackfoot are unlikely to follow from (morpho)syntactic confounds. Any such restrictions are thus likely due to restrictions either (i) from Blackfoot's specific semantic system, or (ii) from universal principles restricting how notions of human reasoning and time can be encoded in a grammar. Research on Blackfoot modal-temporal interactions will thus provide a particularly interesting perspective on the interactions between time, human reasoning and natural language semantics.

To summarize, Blackfoot is particularly suited for semantic investigation into modal-temporal interactions for two reasons: First, the investigation is particularly feasible despite Blackfoot being an understudied language. This is because the previous work on Blackfoot semantics has covered the relevant temporal topics of lexical aspect, grammatical aspect and tense. This previous work also includes prior research into modal-temporal interactions in Blackfoot (Reis Silva (2009b), Reis Silva (2009a) and Reis Silva (in Prep).) Second, the particular morphosyntactic properties

of Blackfoot tense (or lack thereof) presents a chance to investigate modal-temporal interactions without the worry of morphosyntactic confounds.

1.2 Organization of the Dissertation

The dissertation is organized as follows:

1.2.1 Introduction

Chapter 1: Introduction In what remains of chapter 1, I preview the basic empirical phenomena discovered and accounted for in the main chapters of the dissertation. I then outline what I view as the empirical and theoretical goal of natural language semantics, and review how a model theoretic-semantics purports to achieve this goal. This helps to situate the final section of this chapter, which previews the action-based semantics I propose for Blackfoot modal-temporal interactions.

1.2.2 Literature Review

Chapter 2: Blackfoot Basics Chapter 2 is an introduction to the basic grammatical properties of Blackfoot, as well as a guide to Algonquianist terminology. The grammatical sketch focuses on the grammatical aspects of Blackfoot directly relevant for the phenomena investigated; readers who want more information about the grammatical properties of Blackfoot should consult Frantz (2009). This chapter also introduces previous research into Blackfoot semantics and uses this previous research to outline a basic semantic framework for Blackfoot (section 2.2). The list of previous work contains work on lexical aspect (Chin (2008)), grammatical aspect (Dunham (2008)), and tense (Reis Silva & Matthewson (2008)). The chapter closes with an outline for how the various generalizations discussed in the grammatical sketch and review of previous work on Blackfoot can be accounted for within the sort of formal semantic framework introduced in chapter 1, section 1.3. This semantic framework crucially does not include the theoretical machinery required to account for modality and conditionals, however. This is the job of chapter 4, which follows more naturally after the content of chapter 3 has been introduced.

Chapter 3: Literature Review (Modals, Conditionals and Time) Chapter 3 introduces the theoretical literature on modality and conditionals by discussing the standard references on the topic (Kratzer (1977, 1981, 1989, 2012)). As the original works by Kratzer abstract away from issues of temporality, I then summarize works that discuss how a Kratzerian framework (or something very much like it) can be extended to account for interactions between modality and time. In particular, I discuss Ippolito (2003), Condoravdi (2002), Copley (2002, 2009) and Matthewson (2012). I then discuss various approaches to ability modals (e.g., Kenny (1975), Brown (1988), Hackl (1998), Xie (2012)), and the modal-temporal approach to agency of Belnap (1991), Belnap & Perloff (1988) and

Horty (2001). This chapter closes with a discussion of modal approaches to the imperfective aspect (Portner (1998), Deo (2009)).

The main empirical contributions of the dissertation are contained in chapters 4, 5, 6 and 7. In the following subsection, I will discuss these empirical generalisations, as well as discuss some theoretical concepts that help to clarify the data patterns. I will not discuss the theoretical analyses I propose for these data patterns here; see chapter 8 for a summary of the theoretical contributions associated with each chapter.

1.2.3 The Empirical Phenomenon

Chapter 4: Action-Determined Temporal Perspectives Recall that modal claims express conclusions of reasoning processes, as illustrated by the premises (1, 2) and conclusion (3) in (10).

(10) Heather **can** complete a marathon.

1. Heather has completed an Iron Man Triathlon.
2. It's easier to complete marathons than Iron Man Triathalons.
3. Heather **can** complete a marathon.

Condoravdi (2002) uses the term **TEMPORAL PERSPECTIVE** to refer to the time associated with a modal claim's premises (i.e., the time when these premises hold true). A modal claim like (10) has a present temporal perspective - the premises hold true of the present. The example in (11), in contrast, has a past temporal perspective. The premises held true in the past (but may longer hold true at present).

(11) **Context:** Someone stole a painting from a secure area of the art museum three days ago, and two days ago we rounded up the three suspects for questioning: Tiny, Blue-Eyes and Eagle. Yesterday, however, forensics discovered a light-coloured hair at the scene of the crime, ruling out the dark-haired Tiny as a suspect. My supervisor asks me why I bothered bringing Tiny in for questioning.

1. Someone stole a painting from the museum.
2. Tiny, Blue-eyes and Eagle have not been ruled out as suspects.
3. It is possible that Tiny stole the painting.

In chapter 4 I observe that Blackfoot circumstantial modals divide into two types, according to whether or not they allow for a present temporal perspective. While Blackfoot's *áak*-“will” and *aahkama’p*-“might” modals allow for both a present and past temporal perspective, Blackfoot’s

ability modal *ohkott-* only allows for a past temporal perspective, unless it is additionally modified by the imperfective *á-*. The data generalisations are summarized in Table 1.2; please see chapter 4 for the full range of data and generalisations.

Temporal Perspective	<i>áak</i> -P, <i>aahkama'p</i> -P	<i>ohkott</i> -P	<i>á</i> -PROG P
Past	✓	✓	✓
Present	✓	×	✓

Table 1.2: Range of Temporal Perspectives: Blackfoot Circumstantial Modality

In this chapter (chapter 4) I also observe that the ability modal *ohkott-* differs from *áak-* “will” and *aahkama'p-* “might” in that its complement is necessarily agentive. This is shown in the examples in (12) and (13).¹

- (12) a. *#áóhkottsootaa*
á-ohkott-sootaa-wa
 IMPF-ABLE-rain.VAI-3
 ‘It can/could rain.’
- b. *#iihkottsootaa*
Ø-ii-ohkott-sootaa-wa
 PFV-ic-ABLE-rain.VAI-3
 ‘It was able to rain.’
- (13) a. *áaksootaa*
áak-sootaa-wa
 FUT-rain.VAI-3
 ‘It will rain.’
- b. *aahkama'psootaa*
aahkama'p-sootaa-wa
 might-rain.VAI-3
 ‘It might rain.’

While *ohkott-* cannot take the non-agentive predicate *sootaa* “rain” as its complement (12), both *áak-* and *aahkama'p-* allow for non-agentive complements like *sootaa*.² I argue that these two ways in which *ohkott-* differs from *áak-* “will” and *aahkama'p-* “might” is not coincidental. Rather, I argue that *ohkott-*’s temporal restrictions follow from its agentivity requirement. I frame the analysis in terms of an action-dependent semantics for the circumstantial modals and an action-dependent semantics for agentivity.

Chapter 5: Blackfoot Conditionals Chapter 5 looks at conditional constructions in Blackfoot. Conditionals are constructions where one of the premises used to reason has been made overt, as in (14).

- (14) If Heather has completed an Iron Man Triathlon, she can complete a marathon.

The overt premise (“If Heather has completed an Iron man”) is referred to as the conditional **ANTECEDENT**. It differs from the unexpressed premises in unmodified modal claims like (10) and

1. The element *ii-* glossed as ‘ic’ INITIAL CHANGE is discussed in chapter 2. In that chapter I argue that initial change in Blackfoot is purely morphophonological with no semantic effect.
 2. The imperfective *á-* similarly shows no agentivity restriction on its complement.

(11) in that the premise need not be something that the speaker believes to be true. The premise described by an antecedent can even be known to be false - i.e., it can be counterfactual, as in the case in (15).

(15) If Heather trained harder, she would have won the Iron Man.

The conclusion (“She can complete a marathon”/“She would have won the Iron Man”) is referred to as the conditional **CONSEQUENT**. In chapter 5 I look at two aspects of conditional constructions in Blackfoot. First I look at what a consequent has to look like in order to license modification by an antecedent. I observe that in cases where the antecedent describes a situation that causes, or is necessary for, the consequent situation to arise, the consequent requires an overt modal. Furthermore, while *áak*-“will” and *aahkama’p*-“might” are sufficient as overt modals, the ability modal *ohkott*- is not - i.e., *ohkott*- claims cannot be modified by conditional antecedents that describe causes. The crucial data is given below: (16a) shows that a bare ability *ohkott*- claim cannot license a conditional antecedent, unless it is further modified by the licensing modal *áak*-(16b).

(16) **Context:** Last night, I was talking on the phone with my sister, and she said that she was thinking about making bread, but that maybe it was too late. We hung up before she decided on anything. Today, we’re meeting for a picnic lunch, and I wonder what she is going to bring. I say:

- a. #kamíikaihkiitaasi napayin, *iihkotta’pistotaki* *po’tstákssiistsi*
 kam-ikaa-iihkiitaa-si napayin, \emptyset -**ii-ohkott**-a’pistotaki-wa po’tstáksin-istsi
 if-PERF-bake.VAI-SBJ:3 bread, **PFV-ic-ABLE**-make.VAI-3 sandwich-0PL
 ‘Target: If she has made bread, she could have made sandwiches.’
- b. *kamíikaihkiitaasi* napayin, *áakohkotta’pistotaki* *po’tstákssiistsi*
 kam-ikaa-iihkiitaa-si napayin, **áak-ohkott**-a’pistotaki-wa po’tstáksin-istsi
 if-PERF-bake.VAI-SBJ:3 bread, **FUT-ABLE**-make.VAI-3 sandwich-0PL
 ‘If she has made bread, she could have made sandwiches.’

The data in (17) shows that an imperfective marked ability attribution, like the bare form in (16a), fails to license a conditional antecedent. The imperfective *á-*’s ability to license causal conditional antecedents depends, however, on whether the *á-* is interpreted as yielding an episodic in-progress or generic reading; while episodic in-progress readings fail to license conditional antecedents (as in (17)), generic readings succeed, as shown in (18).

- (17) **Context:** We realize that it's my brother's birthday, but we've all been so busy that we haven't had time to plan a party or figure out what kind of gift to get him. We don't want to let his birthday pass without doing anything, so I suggest

#kamohpommaainiki owaistsi, nitáóhkottsipisatsskiit
 kam-ohpommaa-iniki owaa-istsi, nit-á-ohkott-pisat-ihkiitaa
 if-buy.VAI-SBJ:LOC egg-0PL 1-IMPF-ABLE-fancy-bake.VAI

"If I buy eggs, I can bake a cake."

- (18) **Context:** My sister wants me to bake a cake for her. I'm pretty good at making cakes, so I agree. Only, I forget to buy eggs for the cake! I find a recipe for an egg-free cake, but it ends poorly. My sister is making a face as she eats the cake, and I feebly try to defend my cake making skills by saying (Target: "If I buy eggs, I can make cake.")

kamohpommaainiki owaistsi, nitáóhkott(sok)sipisatsskiit
 kam-ohpommaa-iniki owaa-istsi, nit-á-ohkott-(sok-)pisat-ihkiitaa
 if-buy.VAI-SBJ:LOC egg-0PL 1-IMPF-ABLE-(good-)fancy-bake.VAI

'If I buy eggs, I can make (good) cakes [in general].'

Table 1.3 summarizes the licensing generalisations: while *áak-*, *aahkama'p-*, and generic readings of the imperfective suffice to license conditionals antecedents, the ability modal *ohkott-* and the in-progress reading of the imperfective fail to. See chapter 5 for the full range of data. Note that this requirement for a (particular) overt modal can be used as a diagnostic for the sort of relationship that holds between a Blackfoot antecedent and consequent. Only causal conditionals (as described above) require a particular overt modal in their consequent. Conditionals where the antecedent describes evidence for the truth of the consequent (evidential conditionals), and conditionals where the antecedent describes a situation in which the consequent can be felicitously asserted (relevance conditionals), do not require an overt modal in the consequent. This provides cross-linguistic empirical evidence for the three categories of conditional reasoning identified by Sweetser (1991), Dancygier (1998) and Dancygier & Sweetser (2005).³

MODAL Environment	CNSQ	if-clause Licensed?
FUTURE	<i>áak-P</i>	✓
MIGHT	<i>aahkama'p-P</i>	✓
ABILITY	<i>ohkott-P</i>	×
IMPF _{EVENT}	IMPF-P	×
IMPF _{GEN}	IMPF-P	✓

Table 1.3: Licensing Ontic Conditionals with Modals (see chapter 5 for data)

The second aspect of conditional constructions investigated in this chapter is the range of possible temporal and epistemic interpretations associated with a causal antecedent. I show that

3. The terms I use to refer to these categories of conditional reasoning are different than in these cited works, but the categories of conditional reasoning I refer to here seem to exactly map onto the cognitive domains they recognize; Dancygier (1998)'s **CONTENT**, **EPISTEMIC** and **SPEECH ACT** domains map onto my ontic, evidential and relevance relations respectively.

the range of temporal/epistemic interpretations associated with causal antecedents depends on their morphological clause-type: *SUBJUNCTIVE* marked antecedents cannot be interpreted as past (unless a past reference time is made salient), and *UNREAL* marked antecedents must be interpreted as past (unless the antecedent is known to be counterfactual). The data showing the crucial infelicity of a past-interpreted *SUBJUNCTIVE* antecedent is given in (19a); in order for this sort of construction to be allowed, the antecedent must first be marked with the perfect *ikaa-*, so that the antecedent situation is expressed as a *present* perfect, as opposed to a *past* perfective.

(19) **Context:** We aren't sure if Martina is at the department or not. I saw her earlier, but maybe she's left campus since then. I do know, however, that Martina always locks her office before she leaves, so I can find out that way, whether or not she left.

a. #annahk M kamomatoosi omi otsita'potakihpi áakitapiyookim ohkitsim
 annahk M kam-omatoos-i omi ot-ita'potakihpi áak-itapiyooki-m o-kitsim
 DEM M if-leave.VAI-SBJ:3 DEM 3-workplace FUT-lock.VTI-3:0 3-door

'If Martina **left** her office, she will have locked her door.'

b. annahk M kamikoomatoosi omi otsita'potakihpi áakitapiyookim ohkitsim
 annahk M kam-ikaa-omatoos-i omi ot-ita'potakihpi áak-itapiyooki-m o-kitsim
 DEM M if-PERF-leave.VAI-SBJ:3 DEM 3-workplace FUT-lock.VTI-3:0 3-door

'If Martina **has left** her office, she will have locked her door.'

The data showing the infelicity of present and future interpreted *UNREAL* conditional antecedents in non-counterfactual contexts is presented in (20a) and (21a); (20b) and (21b) show that present and future interpreted *UNREAL* antecedents are perfectly felicitous in counterfactual contexts.

(20) Present *UNREAL* Conditional Antecedents

a. **Context:** My dog is whining at you, and you ask me if you should feed him. Since my dog is unhealthily obese, and should only really eat if he's hungry, I tell you: If he's hungry, you should feed him.

#isttso'kiniih^htopi, kitáakoohksí^sowa
 isttso'kini-oh^htopi, kit-áak-noohk-yiiso-a-wa
 hungry.VAI-UNR, 2-c.exp-feed.VTA-1:3-3

'# If he had been hungry, you should feed him'

b. **Context:** We're discussing clichés, and I reason that pigs are so heavy that if they had wings, they wouldn't be able to fly anymore than ostriches can.

áiksini^siksi imínni'ih^htopi, máátáksaakyohkottsipawanií^uwaiksaa,
 aiksini-iksi ii-ominnii-h^htopi, máát-áak-sa:ki-ohkott-ipawaani-waiksaa
 pig-PL if-have-wings.VAI-UNR NEG-FUT-still-ABLE-fly.VAI-nonaff:3pl

'If pigs had wings, they still would not be able to fly'

(21) Future UNREAL Conditional Antecedents

- a. **Context:** My sister has been cultivating these apples which look really delicious. I know she doesn't want them to be eaten yet, but I'm really hungry...

#*nitsíisaykamo'saata'ohtopi* oma apasstaaminaam, nókowaan
nit-ii-sa-ikamo'saata-ohtopi om-wa apasstaaminaam, n-okowaan
1-ic-NEG-steal.VTA-UNR DEM-3 apple, 1-stomach
áakitomatapohtako
áak-it-omatap-ohtako-wa
FUT-RL-start-sound.VAI-3

'#If I **hadn't** stolen that apple, my stomach **would have** started sounding.'

Target: If I don't steal that apple, my stomach will start growling.

- b. **Context:** My brother is participating in a contest, and brags that he will buy lots of food with the prize money. I think this is a waste of prize-money, and even though I'm not a contestant, I speculate on what I would buy with the prize-money.

nitsíimo'tsaakyo'ohtopi, nitáakohpomm ponokáómitaa
nit-ii-omo'tsaaki-ohtopi, nit-áak-ohpommaa ponoka-aomitaa
1-ic-win.VAI-UNR, 1-FUT-buy.VAI elk-dog

'If I should win, I would buy a horse '

This contrasts with the past-interpreted UNREAL conditional antecedents, which are felicitous whether the antecedent is known to be counterfactual or not. This is shown below in (22).

(22) Past UNREAL Conditional Antecedents

- a. **Context:** My sister was running in a race yesterday. I haven't heard whether she won or not yet, but I hope she did, because if she won, we'll eat cake to celebrate.

íimotsaaki'ohtopi matónni nitáakitsoyihpinnaan pisátsskiitaan
ii-omo'tsaaki-ohtopi matonni nit-áak-it-Ioyi-hpinnaan pisatsskiitaan
ic-win.VAI-UNR yesterday 1-FUT-RL-eat.VAI-1PL.EXCL cake

'If she won yesterday, we will eat cake.'

- b. **Context:** When my brother was very young, his pet frog got sucked up the filter. Because he was a very sensitive child, we told him the frog went back to live with its family. If we had told him then, he would have been very upset

iissksiniiohtopi annihk omáánista'pihpi áaksikohtsawahsi'taki
ii-sksiniiohtopi annihk om-aanist-a'pii-hp-yi áak-ikaa-oht-saw-yaahs-i'taki
ic-know.VTI-UNR then 3-manner-happen.vii-cj-0 FUT-PERF-SOURCE-NEG-good-feel.VAI

'If he **had known** what happened at that time, it **would have** made him feel really bad.'

These data generalisations are summarized in Table 1.4; please see chapter 5 for the full range of data.

Chapter 6: Consequences for Prospective Aspect Recall the example of how a modal claim represents a reasoning process (repeated in 23). In addition to identifying the time associated

(i)↓ (ii)→	SBJ Antecedent		UNR Antecedent	
	Possible	Counterfactual	Possible	Counterfactual
Past	×	×	✓	✓
Present	✓	✓	×	✓
Future	✓	✓	×	✓

Table 1.4: (i) Temporal and (ii) Epistemic Restrictions on "If"-clauses

with the premises as a modal claim's **TEMPORAL PERSPECTIVE**, Condoravdi (2002) also identified a temporal relation she termed **TEMPORAL ORIENTATION**. Temporal orientation is the relationship that holds between the time associated with the premises (the temporal perspective) and the time associated with the event described by the modal's complement - i.e., in the case of (23), the runtime of the completing-a-marathon event.

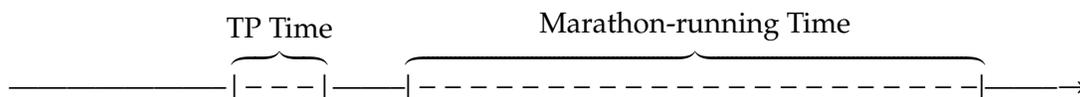
(23) Heather **can** complete a marathon.

1. Heather has completed an Iron Man Triathlon.
2. It's easier to complete marathons than Iron Man Triathalons.
3. Heather **can** complete a marathon.

The only possible reading of (23) is one where the possible Heather-completing-a-marathon event *follows* the present temporal perspective (TP) time, as illustrated below:

(24) **TEMPORAL ORIENTATION**: future/prospective

TP Time < Marathon-running Time



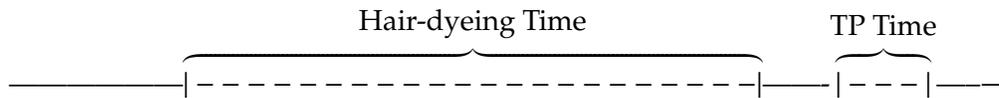
This contrasts with the temporal orientation associated with a modal claim like (25); the only possible temporal interpretation of (25) is one where the Anne-dyeing-her-hair event *precedes* the time on which the claim is based.

(25) **Anne must have dyed her hair with cheap black dye.**

1. The cheap black dye that the peddler sells always turns red hair green.
2. Anne's natural hair colour is red.
3. Anne's hair is green.
4. ∴ Anne dyed her hair with cheap black dye.

- (26) **TEMPORAL ORIENTATION:** past/anterior

Hair Dyeing Time < TP Time



In chapter 6, I show that Blackfoot's so-called 'future' modal *áak*- "will" is not in a 1:1 correlation with future/prospective temporal orientations. There are two kinds of mismatches: semantically future claims that lack *áak*- (e.g., the antecedent of conditionals), and *áak*- claims that are not semantically future (*áak*- claims with stative or stativized complements). Examples of the future-interpreted antecedents were given above in (16) and (18); examples of non-future/prospective oriented *áak*- claims are given below in (27).

- (27) **Context:** My mom is babysitting my niece while my sister goes grocery shopping with me. My sister checks her watch and starts rushing us home because my niece is still nursing and it's time for her feeding. She says:

anna Kaia áaksisttso'kini annohk
 anna Kaia **áak**-isttso'kini-wa annohk
 DEM Kaia **FUT**-hungry.VAI-3 now

'Kaia will be hungry by now.'

- (28) **Context:** There's a secret society, whose initiation process is secret. But rumours suggest that it involves a midnight run along Wreck Beach. Heather is being initiated into the secret society tonight, and I check my watch and see it's midnight. I know she'll never reveal the secret initiation process, so I'll never know for sure, but I figure:

annohk áakitáókska'si omi Wreck Beach
 annohk áak-it-**á**-okska'si-wa omi Wreck Beach
 NOW **FUT-RL-IMPF-RUN.VAI-3** DEM Wreck Beach

"She'll be running on Wreck Beach right now."

- (29) **Context:** I told my sister I was going to bake a cake during the afternoon. In the evening, she's coming over and she's thinking excitedly:

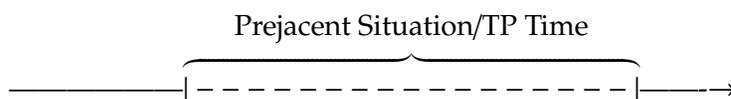
áaksikaipisatsskiitaa
 áak-**ikaa**-pisat-ihkiitaa-wa
 FUT-**PERF**-fancy-bake.VAI-3

"She will have made cake."

(27), (28 and (29) are all interpreted with present/coinciding temporal orientations: the eventualities described by the claim (being hungry, running on Wreck Beach, having made cake) are all eventualities posited to hold true at present, the same time at which the reasoning is based.

(30) **TEMPORAL ORIENTATION:** present/coinciding

Prejacent situation = TP Time



The data generalisations identified for *áak-* in chapter 6 also hold true for the “might” modal *aahkama’p-*; these generalisations are summarized in Tables 1.5 and 1.6. Table 1.5 indicates where future/prospective temporal orientations are allowed in Blackfoot (including *áak-* and non-*áak-* environments), and Table 1.6 indicates when future/prospective temporal orientations are necessary in *áak-* environments.⁴

Prospective Interpretations in:	English	Blackfoot
Prejacent of <i>áak-</i> , <i>aahkama’p-</i>	✓	✓
Conditional Antecedents	✓	✓
Imperfective “Futurates”	✓	×
Unmarked Assertions	×	×

Table 1.5: Contexts where Future/Prospective Interpretations Allowed

<i>áak-</i> ’s complement:	Eventive	Stative
Present Reading	×	✓
Future Reading	✓	✓

Table 1.6: *áak-*’s Allowed Temporal Orientations

Chapter 7: Actuality Entailments (and their imposters) In chapter 7 I look at another aspect of the ability modal *ohkott-*. Ability modals cross-linguistically have been associated with a phenomenon known as **ACTUALITY ENTAILMENTS**, whereby a modal claim entails the truth of its complement (Bhatt (2006), Hacquard (2006)).

(31) **Actuality Entailment (AE)**

When a modal claim entails its non-modal equivalent:

$$\text{MOD } p \Rightarrow p$$

This is a strange property for modal claims to have. Modal claims, in contrast to non-modal claims, are known for not requiring their complement to be true. This can be illustrated with the English modal claims below. Neither (32a) nor (32b) require that their complements (“Walter

4. The term “futate” refers to constructions like “The train leaves tomorrow” or “The train is leaving tomorrow.” These constructions lack overt future morphology, but are interpreted with future interpretations (see Copley (2002, 2009)).

Blythe marries Una Meredith” and “Faith wears her red and blue-striped stockings to church”) be true in the actual world. The complements only have to describe possibilities.

(32) Modal claims that don’t entail the truth of their complements:

- a. **Context:** Una has always had a fancy for Walter, but Walter leaves to be a soldier in WWI before she has a chance to tell him about her feelings.

Walter Blythe **might** have married Una Meredith.

- b. **Context:** Faith has given away her only pair of good stockings to a poor girl, and only has a hideously embarrassing pair with red and blue stripes that she doesn’t want to wear.

Faith **could** wear her red and blue-striped stockings to church, but she won’t.

Faith **should** wear her red and blue-striped stockings to church, but she won’t.

In contrast, ability attributions in languages like Hindi, French and Italian require that their complement hold true in the actual world. Interestingly, this phenomenon is conditioned by aspect: while the perfective (passé composé) case in (33a) entails the truth of its complement, the imperfective case in (33b) does not.

(33) a. PERFECTIVE ASPECT (with actuality entailment)

Pour aller au zoo, Jane a pu prendre le train
 For go to-the.MASC zoo, Jane have can.PST.PFV take the train

‘To go to the zoo, Jane was able to take the.MASC train.’
 (Only OK in contexts where Jane took the train in w_0 .)

b. IMPERFECTIVE ASPECT (no actuality entailment)

Pour aller au zoo, Jane pouvait prendre le train
 For go to-the.MASC zoo, Jane can.PST.IMPF take the.MASC train

‘To go to the zoo, Jane could take the train.’
 (OK if Jane took the train in w_0 , or didn’t.)

Hacquard (2006, pp. 13)

Davis et al. (2010) claim that Blackfoot is an exception to this cross-linguistic generalisation: they show that both perfective and imperfective-marked ability attributions in Blackfoot require real-world events of the type described by their complement. They conclude that ability attributions in Blackfoot, regardless of aspectual marking, have actuality entailments. Examples reproducing their observations are given in (34) and (35). (34) shows that a perfective ability attribution requires a real-world event in order to be felicitous, and (35) shows the same for an imperfective-marked ability attribution.

- (34) **Context:** My uncle is good at drawing portraits, and he had the opportunity to draw my mom's portrait, but he decided not to.

#iihkottsinayii

Ø-ohkott-sina-yii-wa

PFV-ABLE-draw.VTA-3:3'-3

'He was able to draw her.'

Consultant Comment: Sounds like he drew her.

- (35) **Context:** My uncle is good at drawing portraits, and he had the opportunity to draw my mom's portrait, but he decided not to.

#áóhkottsinayii

á-ohkott-sina-yii-wa

IMPF-ABLE-draw.VTA-3:3'-3

'He is able to draw her.'

Consultant Comment: He has to have done it before, so we know for sure.

In this chapter, I show that Davis et al. (2010)'s conclusion - i.e., that ability attributions in Blackfoot are uniformly subject to actuality entailments - does not follow from the data. The observations underlying my claim concern the temporal interpretation of the required real-world events. While the required real-world event for the perfective case has the same temporal orientation as the complement event (and thus can be identified as the same event), the required real-world event for the imperfective case does not have the same temporal orientation as the complement event: while the required real-world event has a past temporal orientation, the complement event has a future temporal orientation. This can be illustrated with the following data in (36), whereby an imperfective-marked ability attribution is infelicitous in contexts where there is no possibility of a future event.

- (36) **Context:** The last portrait my uncle drew was of my mother. But how he has arthritis, and his hands shake too badly to draw.

#áóhkottsinayii

á-ohkott-sina-yii-wa

IMPF-ABLE-draw.VTA-3:3'-3

'#He is able to draw her.'

The (past) required real-world event and (future) complement event thus cannot be identified as the same event. Imperfective ability attributions cannot be said to have actuality entailments according to the definition in (31). The full range of data underlying my claim is presented in chapter 7; Table 1.7 presents the overall generalisations regarding the interaction between (i) the morphological/aspectually-marked form of the ability attribution (i.e., whether it is a bare perfective, imperfective-marked, or *áak*-“will” -marked ability attribution) and (ii) the ability attribution's felicity in contexts that vary in terms of whether there is a real-world past event ('Previous Instance' and the possibility of a future event ('Future Instance')).

CONTEXTS ↓	PFV-ohkott-P	IMPF-ohkott-P	FUT-ohkott-P
Context A: ×Previous Instance ✓Future Instance	×	×	✓
Context B: ✓Previous Instance ✓Future Instance	✓	✓	✓
Context C: ✓Previous Instance ×Future Instance	✓	×	×

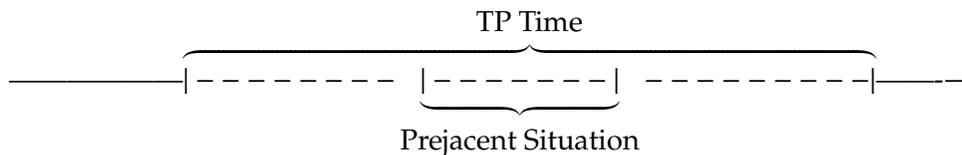
Table 1.7: Felicity Judgements for Blackfoot Ability Attributions

Across Chapters: Epistemic Modality in Blackfoot The majority of the data presented in the dissertation involves the circumstantial modals *áak-*, *aahkama’p-*, *ohkott-* and the imperfective *á-*. At various points in the chapters 4, 5, 6 and 7, however, I contrast the circumstantial modal data with Blackfoot’s epistemic modals. While I have not investigated Blackfoot epistemic modal claims as thoroughly as I have the circumstantial modal claims, there are various empirical contributions that I make regarding Blackfoot epistemic modality.

For instance, in chapter 4 I argue that the temporal perspective and temporal orientation of Blackfoot claims marked with the epistemic modals *aahk-* “must” and *aahkam-* “must/might” pattern as if the complement event is temporally contained within the temporal perspective time.⁵ This contrasts with the range of temporal interpretations associated with the circumstantial *áak-* “will” and *aahkama’p-* “might” modals.

(37) **TEMPORAL ORIENTATION: Perfective or Containment**

Prejacent situation \subseteq TP Time



As the argument for the particular temporal orientation illustrated above relies on the formalization of Blackfoot’s basic tense/aspect patterns as in Reis Silva & Matthewson (2008) (see chapter 2), I will not present the data here. Please see chapter 4 for the relevant data.

Recall that in chapter 5 I show that Blackfoot **SUBJUNCTIVE** conditional antecedents are restricted in terms of their temporal interpretation. In particular, **SUBJUNCTIVE** conditional antecedents cannot

5. I also argue in chapters 4, 5 and 7 that the ability modal *ohkott-* has a similar ‘perfective’ or ‘containment’ temporal orientation, and that this temporal orientation is a consequence of *ohkott-*’s agentivity requirement.

be interpreted as past. This temporal restriction, however, only holds for causal conditionals - i.e., conditionals which require a particular circumstantial modal in their consequent. The SUBJUNCTIVE antecedents of evidential conditionals, which are often expressed with epistemic *aahk-* or *aahkam-* in their consequent, can (and usually are) interpreted as past. This can be illustrated with the data in (38) and (39). In contrast to the infelicity of past-interpreted causal SUBJUNCTIVE antecedents (as in (19) above), the past-interpreted evidential SUBJUNCTIVE antecedents in (38) and (39) are felicitous.

(38) **Context:** Piitaakii, an enemy spy, has infiltrated our camp, stolen information, and escaped. We're trying to figure out (i) how she infiltrated our camp (e.g., which way she came from), and (ii) where she's going, so that we can catch her. We find a scrap of her shirt, where we see a spaghetti sauce stain, which looks and smells like the sauce from a famous restaurant in the north. We conclude:

- a. *kamitóoyo'sisi* *omi itóoyoo'pi, iihto'too* *pinaapohtsi*
 kam-it-ooyo'si-**si** *omi itóoyoo'pi, iiht-o'too-wa* *pinaap-ohtsi*
 if-RL-prepare.meal.VAI-**SBJ:3** DEM restaurant, source-arrive.VAI-3 north-direction

'If she ate at that resturant, she came from the north.'

- b. *kamitóoyo'sisi* *omi itóoyoo'pi, aahkoohto'too*
 kam-it-ooyo'si-**si** *omi itóoyoo'pi, aahk-ooht-o'too-wa*
 if-RL-prepare.meal.VAI-**SBJ:3** DEM restaurant, **EPIST**-source-arrive.VAI-3
pinaapohtsi
pinaap-ohtsi
 north-direction

'If she ate at that resturant, she must have come from the north.'

(39) **Context:** We're bugging her friend's phone, and when Piitaaki contacts her friend, we listen in on the phone call, and it sounds like we can hear a horse in the background. There are only stables in the west and east, so we figure:

- a. *kamíikamo'tsisi* *ponokaomitaa, iihto'too* *nimmohtsi* *tsaahto*
 kam-ikamosat-yii-**si** *ponokaomitaa, iiht-o'too-wa* *nimm-ohtsi* *tsaahto*
 if-steal.VTA-3:3'-**SBJ:3** horse, source-arrive.VAI-3 west-direction or
isskihtao'ohtsi
isskihtao'-ohtsi
 east-direction

"If she stole a horse, she went west or east."

- b. *kamíikamo'tsisi* *ponokaomitaa, aahkoohto'too* *nimmohtsi* *tsaahto*
 kam-ikamosat-yii-**si** *ponokaomitaa, aahk-ooht-o'too-wa* *nimm-ohtsi* *tsaahto*
 if-steal.VTA-3:3'-**SBJ:3** horse, **EPIST**-source-arrive.VAI-3 west-direction or
isskihtao'ohtsi
isskihtao'-ohtsi
 east-direction

'If she stole a horse, she must have gone west or east.'

In chapter 7, I show that uses of Blackfoot epistemic *aahk-*, like uses of the ability modal *ohkott-*, commit the speaker to the truth of their complement. I further argue that this reflects the perfective containment temporal orientation proposed for *aahk-* in chapter 4.

This concludes the preview summary of this dissertation's empirical contributions. Because the theoretical contributions more naturally follow after a more thorough review of the theoretical literature (chapters 2 and 3), I leave a summary of the theoretical contributions to my conclusion chapter, chapter 8.

1.2.4 Conclusion

Chapter 8: Issues for Further Research This chapter summarizes the main empirical and theoretical contributions of the dissertation, and then discusses how the main theoretical claims (i.e., an action-dependent framework for circumstantial modality) can be connected to other theoretical innovations involving actions or similar sorts of elements like Van Rooy (2003)'s incorporation of Decision Theory into dynamic semantics and Copley & Harley (2011)'s Force-Theoretic Framework.

One conclusion I reach is that the action-dependent approach I take is compatible with Van Rooy (2003)'s Decision Theory approach, although the formalizations we adopt differ according to our different analytical goals. The particular set of Blackfoot data I aim to account for requires me to explicitly link actions to sub-sentential semantic elements (like tense and aspect), where Van Rooy (2003)'s goals allow him to abstract away from sub-sentential semantic elements. The particular scope of the empirical generalisations I aim to account for in this dissertation also allows me (for the time being) to abstract away from important aspects of Decision Theory that Van Rooy (2003) incorporates. For instance, I do not provide a fully articulated system for how a speaker/reasoner determines an agent's goals/desires and beliefs, while Van Rooy (2003) formalizes these with a utility function and a discrete probability function. Further investigation into how these factors interact with Blackfoot modals may benefit from an adaption of the Decision-Theoretic approach that Van Rooy (2003) provides. The second conclusion I reach is that while the action-dependent approach I propose has many parallels to the Force-Theoretic approach that Copley & Harley (2011) present, they are not formal equivalents, as my notion of an action (unlike their notion of a force), does not replace the notion of an event as a particular.

This chapter also considers how the formal semantic framework I propose can be made compatible with current proposals regarding Blackfoot syntax (i.e., Ritter & Wiltschko (2004, 2009), Bliss (2013) and Ritter (2014)). The general conclusion is that the semantic framework I propose is fundamentally incompatible with a Cinque (2002)/Rizzi (1997) cartographic approach: the modifier-like semantics that I propose for Blackfoot tense and modals cannot be combined with a system where the meaning of a morpheme strictly constrains the morpheme to a particular place

in a syntactic spine. The system I propose thus requires something more flexible, like Déchaine & Wiltschko (2011)'s Universal Spine Hypothesis, and in particular, Ritter & Wiltschko (2004, 2009)'s Person-Based functional structure for Blackfoot, wherein at least tense and aspect morphemes in Blackfoot are not constrained to merging at particular positions in a universal spine. The other option would be to assume a purely minimalist framework that assumes no universal categories and universal spine. The adoption of Bliss (2013)'s particular formalization of Ritter & Wiltschko (2004, 2009)'s Person-Based functional structure for Blackfoot, however, leads to an interesting consequence. In order to reconcile the semantics I propose with Bliss (2013)'s proposed functional structure for Blackfoot, I must assume that the TAM (tense, aspect, modal) morphemes I discuss are modifiers that merge no higher than the vP-level. This mirrors the conclusion that Ritter (2014) independently comes to based on strictly morphosyntactic restrictions regarding abstract nominalizations in Blackfoot.

This concludes the preview summary of the dissertation. As the dissertation deals with semantic data and presents formal semantic analyses, but may draw readers primarily interested in Blackfoot, in the following section I present some of my basic assumptions regarding what I view to be the primary goals and null hypotheses of a semanticist.

1.3 Basic Semantic Framework

The goals of this dissertation are two-fold: First, I aim to describe how Blackfoot behaves with respect to certain semantic phenomena, and second, I aim to describe a semantic computational system that models these data. In this section, I lay out what I view as the goal of a semanticist - i.e., what sort of data is (minimally) within a semanticist's purview, and describe how a model-theoretic semantics aims to account for this data.

1.3.1 Semantic Data: Truth and Felicity Judgements

It is important to be explicit about the distinction between morphosyntactic and semantic phenomena. This distinction is embodied in the difference between grammaticality judgements and truth-value/felicity judgements.

As I see it, the goal of morphosyntactic theory is to account for the patterning/distribution of morphemes/words. A fieldworker can construct a sentence for their language consultant, ask if the sentence is grammatical, and the judgement that the consultant gives (good, not good),⁶ as represented in (40) and (41), is a piece of morphosyntactic data. Thus a native speaker of standard English, when offered sentences such as (40a) and (41d) will judge these as poor sentences of English, despite the fact that they will likely be able to figure out what is meant by these

6. This is a simplification. 'Good' and 'not good' may merely represent polar ends of a spectrum of grammaticality.

ungrammatical sentences. I assume that patterns of grammaticality judgements of this type are what a morphosyntactic framework should minimally account for.

- (40) a. *Sylvester am/be/are the Duke of Salford.
b. Sylvester is the Duke of Salford.
- (41) a. Phoebe accused Sylvester of ruining her reputation beyond salvation.
b. Who_i did Phoebe accuse t_i of ruining her reputation beyond salvation?
c. Phoebe's accusation that Sylvester ruined her reputation triggered his proposal.
d. *Who_i did Phoebe's accusation that t_i ruined her reputation triggered his proposal?

The goal of semantic theory, in contrast, is to account for the patterns/distribution of meaning. By *meaning*, I refer to two different types of phenomena - **TRUTH** and **FELICITY**.

Many approaches to formal semantics cast the meaning of a sentence as its truth-conditions (Tarski (1956)). A fieldworker thus can provide their consultant a context, offer a sentence, and then ask whether or not the sentence is true in that context. The judgement of truth (true or false) that the consultant gives, as represented in (42), is semantic data (Matthewson (2004)).

- (42) a. **Context:** Phoebe met Sylvester, the Duke of Salford, during her season in London, and was struck by his villainous eyebrows and abominable pride. Never expecting to interact with him again, she wrote the villain in her gothic novel in his image.

If she had known she was going to fall in love with him, Phoebe would never have made Sylvester the villain of her gothic novel.

True!

- b. **Context:** After being snowed-in at a roadside inn, Sylvester and Phoebe are forced to spend a week in each other's company. They end up becoming friends, and (unknown to the other party) falling in love. When Phoebe's novel ends up being published by a well-meaning friend, however, Sylvester, clearly recognizing himself as the villain, becomes haughty and withdraws his friendship.

If Phoebe had never cast Sylvester as the villain in her novel, Sylvester never would have fallen in love with her.

False!

Another important aspect of meaning, in addition to a sentence's truth-conditions, are the contexts in which a sentence can be uttered without sounding strange or out of place. These are called felicity conditions. A fieldworker can provide their consultant with a context, offer a sentence, and then ask whether or not the sentence is felicitous. A judgement of felicity ranging

from 'sounds perfect (felicitous)' to 'sounds extremely weird (infelicitous)', as represented below in (43), is also semantic data (Matthewson (2004)).

(43) **Context:** Phoebe feels terrible for having written Sylvester as the villain of her gothic novel, especially since Sylvester's widowed sister-in-law, Lady Ianthe, was inspired by Phoebe's novel to steal Sylvester's ward, Edmund, away to France. She could exclaim:

- a. # If I cast Sylvester as the villain of my novel, Lady Ianthe will think to steal Edmund away to France!

Infelicitous!

- b. If I hadn't cast Sylvester as the villain of my novel, Lady Ianthe would never have thought to steal Edmund away to France!

Felicitous!

I will assume that patterns of truth-value/felicity judgements are what a semantic framework should minimally account for. In the following sections, I will outline how a semantic theory aims to account for these types of data.

1.3.2 Modelling Truth: Model-Theoretic Frameworks

The sort of semantic theory I adopt to account for truth-value judgements is a model-theoretic semantics. Such systems consist of at least three formal components: the model/ontology, lexical entries, and composition rules. The basic assumption of these models is that when you know what a sentence means, you know what a bit of the world must look like in order for that sentence to be **TRUE** (Tarski (1956), Wittgenstein (1922), Montague (1973), Partee (1973), Heim & Kratzer (1998) ao). For example, if I told you "Two cats are lying on that rug" you would know that if I were telling the truth, then there would be a bit of the world that looks somewhat like the picture below:



Figure 1.4: Figure Illustrating "Two cats are lying on that rug."

The phrases *two cats*, *on the rug* and *are lying*, map onto specific concepts, and the way these phrases combine tell you how to combine these concepts to create a picture of the world. Lexical entries are the part of a model-theoretic semantics that indicate, given the strings of sounds in the

sentence, what sorts of conceptual components are meant to be in the picture of the world “drawn” by the sentence. In other words, lexical entries encode a mapping from the sounds of a language to the concepts a language can convey.

The model/ontology is the part of the semantic system that models these conceptual components; the lexical entries map onto concepts by referring to items (or sets or n-tuples of items) in the ontology. The compositional rules are the part of a model-theoretic semantics that provide the arrangement of the ontological components into the “picture of the world” - these indicate, for example, that the ontological entities represented by *two cats* are members of the set of ontological entities represented by *are lying on the rug*. In what follows, I will go into more detail regarding these three components of a semantic system, starting with the ontology.

The Ontology

The ontology can be conceptualized as akin to the physical components of a board game or card game. For example, the ontology would be like the physical cards, i.e., the 3 of hearts, the jack of spades, etc., in a deck of cards. Or consider the game Clue(do). The ontology for Clue would correspond to the character figurines (or coloured gamepieces) that represent the suspects, and the weapon figurines, the board, etc.

It's easy to see how you could model real world situations by using Clue gamepieces: you use the character figurines to stand in for people in the actual world, you use the weapon figurines to stand in for actual weapons, and the gameboard sections to stand in for actual places. In a semantic system, the ontology (unfortunately) doesn't have physical components. Instead, the components are represented with abstract symbols. So say the actual world contains a candlestick. We have a corresponding abstract element representing that candlestick in our ontology. We can represent it with the lower case letter **a**. Say the actual world has someone named Sylvester in it. We have a corresponding abstract element representing Sylvester in our ontology. We can represent this element with the letter **b**.

These abstract elements, **a**, **b**, **c**, are **INDIVIDUALS** that are part of our ontology - i.e., elements that are supposed to represent objects/individuals in the world (real or imagined). We call the set of all of these elements **THE DOMAIN OF INDIVIDUALS** and represent this set/domain with capital letter **D**. Because we are talking about sets, formal set notation becomes useful. Sets are denoted with curly brackets; elements inside the set are listed inside the curly brackets, e.g. $D = \{a, b, c, \dots\}$. Note that the order of elements inside the set doesn't matter, so $\{a, b, c\} = \{b, c, a\} = \{c, b, a\}$ etc.

Because we want to account for truth-value judgements, it's also important to represent truth-values in our ontology. The value “true” is represented with the abstract symbol **1**, and the value “false” is represented with the abstract symbol **0**. We call the set of these truth-values **THE DOMAIN**

OF TRUTH-VALUES and represent this set/domain with the capital letter T, $T = \{0, 1\}$.

(44) The Ontology so far

- a. $D = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \dots\}$ (individuals)
- b. $T = \{0, 1\}$ (truth-values)

This is an extremely minimal ontology - it consists of only individuals and truth-values. More complex ontologies will have abstract elements representing other things as well. For example, if we want to talk about the temporal relationship between things, a useful thing to have in our ontology would be a domain of times, I, consisting of a set of times $\{t_1, t_2, t_3, t_4, \dots\}$. If we want to talk about events, E is the set of events $\{e_1, e_2, e_3, e_4, \dots\}$. If we want to talk about ways the world might be or could have been, we'll want to have W, the set of possible worlds $\{w_1, w_2, w_3, w_4, \dots\}$. These domains will be discussed more in chapter 3 and 4.

(45) A More Complex Ontology

- a. $D = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \dots\}$ (individuals)
- b. $T = \{0, 1\}$ (truth-values)
- c. $I = \{t_1, t_2, t_3, t_4, \dots\}$ (times)
- d. $E = \{e_1, e_2, e_3, e_4, \dots\}$ (events)
- e. $W = \{w_1, w_2, w_3, w_4, \dots\}$ (worlds)

The domains within the ontology have so far been described as unstructured sets of entities. Most semantic theories, however, also include as part of the ontology, structure within these domains. For example, the set of times $\{t_1, t_2, t_3, t_4, \dots\}$ is usually structured so that times are linearly ordered by means of the precedence relation, so that t_1 precedes ($<$) t_2 , and $t_2 < t_3$. Similarly, the domain of individuals, $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \dots\}$, and the domain of events, $\{e_1, e_2, e_3, e_4, \dots\}$, are usually structured such that the entities are partially ordered by means of the part-of relation (\leq). These structural restrictions are usually used to model entailment relations between sentences predicated of entities that are structurally related in the ontology.

Summarizing, the ontology of a semantic system contains entities which are meant to model entities in the actual world (or possible worlds), as well as structural relationships between these entities. The approach that I take is meant to be one where the ontology of a semantic system is an arbitrary abstraction from the actual world; while the ontology is usually highly influenced by how the actual world is structured (or perceived to be structured),⁷ it is not strictly constrained by it. Thus any empirically-driven claim regarding how a language ontologically represents individuals, events, times or worlds (e.g. whether it represents times as dense, or whether there are atomic,

7. If this were not the case, the model would do a poor job of modelling events in the world.

indivisible time units, etc.) is not meant as a claim about how their metaphysical counterparts are structured in the universe, nor a claim about how a speaker of the language perceives these metaphysical notions. The ontology restricts what sorts of operations can occur in the semantic component of the grammar, and thus should only be motivated by how the language behaves, as opposed to being motivated by one's intuitions regarding how the world is structured (or is perceived to be structured), or being motivated by scientific claims of how matter is structured. That a semanticist should be focussed on how a language structures these metaphysical notions, as opposed to how these metaphysical notions may actually be structured (or perceived to be structured) is a view present in Bach (1986)).

A semantic theory for natural language also aims to account for how the words of that language are used to refer to things or relations between things in the ontology. Thus, the second crucial part of a semantic theory that I will address is the mapping between the language's words and the ontology. As mentioned before, this mapping is done via lexical entries - the idea is that each word in a language's lexicon/vocabulary is associated with a lexical entry which makes reference to components of the ontology.

Lexical Entries

Lexical entries can be conceptualized like the association between the words you use during play (i.e., when playing card/board games), and the elements of the ontology. So let's say we have a deck of cards as our ontology - then the word *red* would be associated with the set of red cards in the deck. The word *heart* has a lexical entry that says *heart* refers to the set of cards that have that red heart symbol on them. *King of Hearts* refers to that one card in the deck that has a K symbol, a heart symbol (and a picture of a man with no mustache and a sword sticking into his head). And the word *hand* refers to the set containing all of the possible 5-card combinations (e.g., in Poker). If our ontology consists of the things in a box of Clue, then lexical entries are relationships like that between the word/name *Colonel Mustard* and the yellow gamepiece. The word *suspect* refers to the set of coloured gamepieces. The word *weapon* refers to the set of weapon figurines. And the words *suggestion* and *accusation* both consist of sets containing i) one gamepiece, ii) a room and iii) one weapon figurine (but *suggestion* and *accusation* differ in that the room is restricted for a *suggestion* to being the room that the current player's gamepiece is in, but the specification of the room is unrestricted for an *accusation*).

So in a model-theoretic semantics, the lexical entries of words are the relationships between those words and elements in the ontology (i.e., elements in D, T, I, W, etc.) We set up our lexical entries so that the word *dog* has a lexical entry saying that *dog* refers to the set of abstract elements in your ontology that represent dogs. *Red* refers to the set of abstract elements in your ontology that represent red things. *Hungry* refers to the set of abstract elements in your ontology that are hungry things. A verb like *love* refers to a set of pairs, $\langle x, y \rangle$, where the individuals x and y are such that x

loves *y*. Note that this shows that the words in a language don't have to correspond to primitive (or underived) elements in the ontology, but they can also correspond to complex (i.e., derived) elements, where an ordered pair $\langle \mathbf{a}, \mathbf{b} \rangle$ is a complex element of the ontology derived from the two primitive elements \mathbf{a} and \mathbf{b} . This is an important thing to note - the majority of the constructions I address in this dissertation deal with lexical entries that make reference to structurally complex elements in the proposed ontology. Note that an ordered pair, $\langle x, y \rangle$ or n-tuple, $\langle a_1, a_2, \dots, a_n \rangle$, differs from a set $\{x, y, \dots, z_n\}$ in that the order of elements within the n-tuple matter. Thus while $\{a, b\}$ is equivalent to $\{b, a\}$ (elements within the set being equal), $\langle a, b \rangle$ is a distinct pair from the pair $\langle b, a \rangle$ (elements within the n-tuple not being equal). Treating predicates like *love* as sets of ordered pairs, as opposed to unstructured sets is necessary because "Helena loves Demetrius" is not equivalent to "Demetrius loves Helena."

Composition Rules

Now, the third crucial part of a semantic theory is a set of rules that restrict how the words of a language - in particular, their lexical entries - can combine with each other, to yield truth-values. These are the "Composition Rules." Once we have these, we can talk about how we relate sentences to truth-values.

Consider a sentence like "Edmund (is) hungry."⁸ We have previously set up our semantic system so that :

- (i) *Edmund* refers to c
(where c maps onto a person in the actual world)
- (ii) *hungry* refers to a set of abstract elements $\{a, f, b, \dots\}$
(where these elements map onto hungry things in the actual world.)

Syntactic rules can take a word like *Edmund* and combine it with a word like *hungry*, and what we end up with is the resulting sentence, "Edmund (is) hungry." The semantic rule associated with combining words this way (we can call this hypothetical rule **PREDICATION**) says that this sentence is given the truth-value **1** ("true") if and only if c (the meaning of *Edmund*) is a member of the set $\{a, f, b, \dots\}$ (the meaning of *hungry*).⁹ If c is not a member of the set $\{a, f, b, \dots\}$, then Predication tells us that the sentence is given the truth-value **0** ("false").

Now consider a sentence like "Edmund loves Rover." We have decided that

8. We will simplify and abstract away from what *is* means for simplicity. If the simplistic system works, then we can later modify it to try and account for the differences in meaning that words like *is* convey.

9. This Predication rule is not actually used in the semantic literature - for one thing, it ignores basic syntactic assumptions (e.g., for transitive verbs, that the theme and agent merge at distinct points in the derivation). It is the simplest rule that I could think of, however, while maintaining the simplistic set-theoretic conceptualization of the semantic system I have been describing here. The standard semantic rule **FUNCTION APPLICATION** will be introduced after I discuss characteristic functions (of sets).

- (i) *Edmund* refers to **c**
- (ii) *Rover* refers to **e**
- (iii) *loves* refers to the set of $\langle x,y \rangle$ pairs such that x loves y ,
e.g. $\{\langle \mathbf{c},\mathbf{e} \rangle, \langle \mathbf{b},\mathbf{a} \rangle, \langle \mathbf{e},\mathbf{d} \rangle\}$.

The rule Predication tells us that the combination of *Edmund*, *loves* and *Rover* forming the sentence "Edmund loves Rover" is considered true (i.e., maps onto the value 1) if and only if the pair $\langle \mathbf{c},\mathbf{e} \rangle$ is a member of the set that "love" refers to. Since it is, "Edmund loves Rover" is true. If $\langle \mathbf{c},\mathbf{e} \rangle$ is not a member of the set that *love* refers to, then the rule "Predication" tells us that the sentence is false.

Next consider the sentence "Rover (is a) hungry dog."

- (i) *Rover* refers to **e**
- (ii) *hungry* refers to the set of elements that represent hungry things (let's say $\{\mathbf{e}, \mathbf{b}\}$, if it turns out that the dog that **e** refers to in the actual world is hungry, and the individual that **b** refers to in the actual world is hungry, and no one else that our ontology makes reference to is hungry)
- (iii) *dog* refers to the set of elements that represent dogs (e.g. $\{\mathbf{e},\mathbf{f}\}$)

First we consider how *hungry* and *dog* combine together to form *hungry dog*. Let's call the semantic rule that tells us how the lexical entries of *hungry* and *dog* combine **MODIFICATION**. Modification says that you take the sets that the lexical entries denote, and end up with a new set which contains just those elements there are members of both sets. So you take the set of hungry things $\{\mathbf{e},\mathbf{b}\}$, and the set of dogs $\{\mathbf{e},\mathbf{f}\}$, and end up with the set that contains just those elements that are members of both of those sets - i.e., $\{\mathbf{e}\}$.

Now *Rover* combines with *hungry dog* via Predication, which tells us that "Rover is a hungry dog" is true (i.e., yields the truth-value 1) if and only if the element referred to by *Rover* is a member of the set referred to by *hungry dog* - i.e., if **e** is a member of $\{\mathbf{e}\}$. Since this is the case, "Rover is a hungry dog" is true. Contrast "Rover is a hungry dog" with the sentence "Fred Penner is a hungry dog."

- (i) *Fred Penner* refers to **b**
- (ii) *hungry* refers to the set of elements that represent hungry things (let's say $\{\mathbf{e}, \mathbf{b}\}$, if it turns out that the dog that **e** refers to in the actual world is hungry, and Fred Penner is hungry, and no one else that our ontology makes reference to is hungry)
- (iii) *dog* refers to the set of elements that represent dogs (e.g. $\{\mathbf{e},\mathbf{f}\}$)

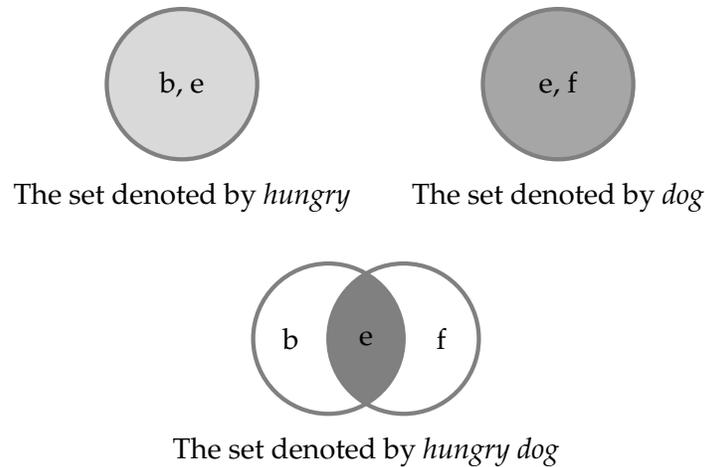


Figure 1.5: Set Intersection

As before, *hungry dog* denotes the intersection of *hungry* $\{e,b\}$ and *dog* $\{e,f\}$ - i.e., $\{e\}$. When *Fred Penner* \mathbf{b} combines with *hungry dog* via Predication, the definition of Predication tells us that “Fred Penner is a hungry dog” is true (i.e., yields the truth-value $\mathbf{1}$) if and only if the element referred to by *Fred Penner* is a member of the set referred to by *hungry dog*. Because \mathbf{b} is not member of $\{e\}$, “Fred Penner is a hungry dog” is false.

The aim of this section has been to lay out a simple semantic framework that one can use to model truth-value judgements. However, the particulars of the framework - i.e., the way the ontology was set up, the way the lexical entries were formalized, etc., - were chosen with the following goal: I wanted to, as quickly and using the fewest unmotivated formalisms as possible, convince the reader that:

- (i) truth-value judgements are a non-subjective way to quantify what (at least one aspect of) the meaning of a sentence is, and
- (ii) a semantic system consisting of an ontology, lexical entries and compositional rules can model truth-values - in particular, it can precisely model how the words making up a sentence combine to create something that corresponds to a native speaker’s intuitions regarding the contexts in which the sentence in question is true.

Typed Lambda Calculus: Semantics á la Heim & Kratzer (1998)

The particulars of the framework outlined above, while having the advantage of being simple, are not very convenient for discussing the specific types of data I address. Because of this, for the rest of the dissertation I adopt a modification of such an approach. For instance, above I framed the discussion of lexical entries in terms of sets. The general approach that I take in the dissertation, however, is one where lexical entries do not denote sets, but rather the characteristic functions of

those sets (Heim & Kratzer (1998)). Thus *dog* will not denote the set of individuals in the ontology that correspond to dogs in the world of evaluation, but rather the function that takes an individual, and yields true (1) if that individual is a member of the set of individuals that correspond to dogs in the world of evaluation, and false (0) otherwise.

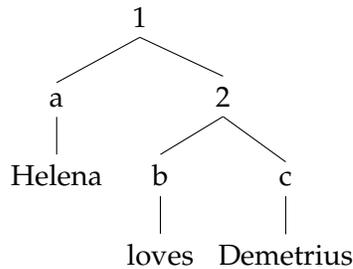
Correlatingly, because I am representing the lexical entries of nouns and verbs as functions (as opposed to sets), the compositional rules that were introduced need to be reformulated in “function-talk” instead of “set-talk”. This is because while we can talk about an individual being a member of a set, we cannot technically talk about an individual being a member of a function (as per our previous Predication rule). We also cannot technically talk about taking the intersection of two functions, whereas we could talk about taking the intersection of two sets (as per our previous rule Modification). The rules that will replace these rules are **FUNCTION APPLICATION** and **PREDICATE MODIFICATION**, respectively (cf. Heim & Kratzer (1998)).

Function Application is an operation that combines a function and an element of the correct semantic type to be that function’s argument. The output of Function Application is the value of that function at the given value for that argument. For instance, if the lexical entry for *hungry* combines with the lexical entry for *Edmund*, the output will be the truth-value “true” (if Edmund is a member of the set of hungry entities) or “false” (if he is not). Predicate Modification is an operation that combines two functions of the same semantic type. Its output is another function of the same semantic type - specifically, the function which yields true only for the arguments which yield true for both of the input functions. For instance, if the lexical entries for *dog* and *hungry* combine via Predicate Modification, the output of that operation is the function that yields “true” if and only if the argument taken is a member of the intersection of the set of dogs and the set of hungry things.

Note that Function Application (FA) is much more general (and therefore more powerful) than the previous Predication operation, which could only yield a truth-value as its output. The output of Function Application is determined by the type of function it combines with an argument: if that function is a function to the domain of individuals, then FA will yield an individual; if the function is a function to the domain of events or times, then FA will yield an event or time; if the function maps to another function, then the output of FA will be a function which can itself be combined with another argument via Function Application. The lexical entry for *love* can be formalized as a function of this type - i.e., a function from the domain of individuals to the domain of functions from individuals to truth-values. This sort of compositional structure can be represented by the tree in (46). In this structure, the internal argument (theme) *Demetrius* first combines with the function ‘love,’ yielding another function (*love Demetrius*, the node labelled 2 in (46)), which combines with the external argument *Helena*. Note that the compositional structure reflects the unequal status of the two arguments. *Helena* and *Demetrius* are the arguments to two different functions; *Demetrius* is the argument to the function represented by *love*, and *Helena* is the

argument to the function represented by *love Demetrius*.

(46)



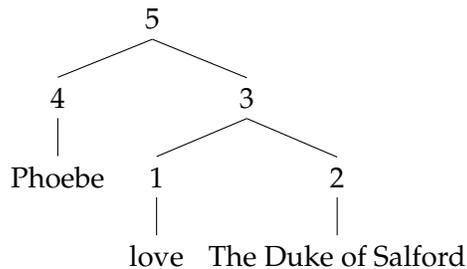
I follow the wide-spread convention of representing functions within a typed lambda calculus. The lexical entry for *love*, then, a function from the domain of individuals to the domain of functions from individuals to truth-values, can be represented with a lambda(λ)-notation, like (47). The λx indicates the kind of argument that the function takes as an argument; x is standardly used as a variable over individuals. The material after the period indicates the output/yield of the function. In this case, the output/yield is another function, and is hence represented with another lambda-expression ($[\lambda y.love(x)(y)]$).

(47) $[\lambda x.[\lambda y.love(x)(y)]]$

(A lexical entry for *love*)

Thus *love* can combine with *The Duke of Salford* (which maps onto an individual, say, **s**) via function application yielding the function in (48-3). This function can in turn combine with *Phoebe* (which maps onto an individual, e.g., **p**) via function application, yielding the proposition (an element with a truth-value) in (48-5).

(48) Phoebe loves the Duke of Salford



1. $love = [\lambda x.[\lambda y.love(x)(y)]]$
2. $The\ Duke\ of\ Salford = \mathbf{s}$
3. $love\ the\ Duke\ of\ Salford$
 $= [\lambda x.[\lambda y.love(x)(y)]] (\mathbf{s})$
 $= [\lambda y.love(\mathbf{s})(y)]$
4. $Phoebe = \mathbf{p}$

FUNCTION APPLICATION

5. *Phoebe loves the Duke of Salford*

$$\begin{aligned}
 &= [\lambda y.love(s)(y)](p) \\
 &= love(s)(p) \\
 &= \text{true iff Phoebe } (p) \text{ loves the Duke of Salford } (s)
 \end{aligned}$$

The formalism is referred to as a “typed” lambda calculus because all of the arguments and functions manipulated by the lambda calculus are specified as having a particular “type.” Individuals (like “Phoebe” p , “Sylvester” s) are of type e , truth-conditions (like “true” 1 , “false” 0) are of type t . The types of functions are represented using pair-notation, where the first member of the pair indicates the type of the function’s input, and the second member of the pair indicates the type of the function’s output. Thus a one-place predicate, i.e., a function from individuals to truth-values (like “dog”), is of type $\langle e, t \rangle$, and two-place predicates (like “love”), which are formalized as functions from individuals to functions from individuals to truth-values, are of type $\langle e, \langle e, t \rangle \rangle$. Types are a way of constraining the combinatorial system; a function can only take (and yield) elements of the right type. I follow convention in representing the semantic type of a function with subscripts to the right of the symbol representing that function. That is, a variable for a function of type $\langle e, t \rangle$ will be notated as $P_{\langle e, t \rangle}$, and a variable for a function of type $\langle e, \langle e, t \rangle \rangle$ will be notated as $P_{\langle e, \langle e, t \rangle \rangle}$.

(49) Types

- a. Individuals: type e
- b. Truth-Values: type t
- c. If σ is a type, and τ is a type, then $\langle \sigma, \tau \rangle$ is a type
- d. One-place predicates: type $\langle e, t \rangle$
- e. Two-place predicates: type $\langle e, \langle e, t \rangle \rangle$

The more general and powerful typed lambda-function approach makes it easy to formalize how determiners/demonstratives and bare nouns combine to form noun phrases, using Function Application. Thus something like *that* could be formalized with a lexical entry like (50).¹⁰

$$(50) \quad \lambda P_{\langle e, t \rangle} : \exists x \in C[P(x)] . x \quad (\text{A simplified lexical entry for } that)$$

“that” is a function that takes a one-place predicate/function, P , and yields a contextually-salient individual that P is true of.

That is, *that* denotes a function that takes a function of type $\langle e, t \rangle$ and yields an individual, x , of type e (51). The individual that this function yields, however, cannot be any old individual.

10. This is not a claim about the semantics of English demonstratives like *that*. The purpose of this discussion is merely to give some examples of how the combinatorial semantic system works, and not to accurately represent the semantics of English determiners/demonstratives.

When “that” combines with something like “dog,” the individual that the phrase “that dog” refers to must be a contextually-salient individual contained within the set of dogs. This restriction (i.e., the requirement that there exists some individual, x , among the contextually-salient individuals in C , that the property P is true of) is represented as a presupposition, $\exists x \in C[P(x)]$, in the lambda-expression in (50), following a colon after the λ operator, but preceding the period that demarcates the output of the function.¹¹

(51) *that dog*

- | | | |
|----|---|-----------------------|
| a. | $\lambda P_{\langle e, t \rangle} : \exists x \in C[P(x)] . x$ (“dog”) | Lexical Entry Look-Up |
| b. | $\lambda P_{\langle e, t \rangle} : \exists x \in C[P(x)] . x (\lambda y. dog(y))$ | Function Application |
| c. | $\exists x \in C[\lambda y. dog(y)](x) . x$ | Lambda Simplification |
| d. | $\exists x[dog(x)] . x$ | |
| e. | i.e., x , such that $x \in C$ (i.e., is contextually-salient) and $dog(x)$ (i.e., x is a dog) | |

The output of this function (x) can then act as an argument to some other function of type $\langle e, t \rangle$ (e.g. *hungry*) to yield a proposition, as in (52).

(52) “That dog (is) hungry.”

- | | |
|----|--|
| a. | $[\lambda y. hungry(y)] (that\ dog)$ |
| b. | $[\lambda y. hungry(y)] (x)$
(Presupposition: x is contextually-salient and x is a dog) |
| c. | $[hungry(x)]$
= true iff x is a member of the set of hungry things.
(Presupposition: x is contextually-salient and x is a dog) |

Similarly, something like *every* can be formalized with a lexical entry like (53), and combine with a noun like *dog* to form *every dog* as in (54).¹²

11. I’ll assume a basic definition where a presupposition is proposition that is assumed to be true, regardless of non-veridical elements in the assertion (e.g., modals, negation, conditionals). The issue of presupposition projection is orthogonal to the theoretical claims I make in this dissertation.

12. The output of this operation is a function that can combine with a lexical item like *hungry* via Function Application to yield a proposition, as in (1).

- | | |
|--------|--|
| (i) a. | $[\lambda Q. \forall x[dog(x)] \rightarrow [Q(x)]] (\lambda y. hungry(y))$ |
| b. | $\forall x[[dog(x)] \rightarrow [[\lambda y. hungry(y)](x)]]$ |
| c. | $\forall x[[dog(x)] \rightarrow [[hungry(x)]]]$ |

= true iff for all x , such that x is a member of the set of dogs, x is a member of the set of hungry things.

(53) A lexical entry for *every*
 $\lambda P_{\langle e,t \rangle} . \lambda Q_{\langle e,t \rangle} . \forall x [[P(x)] \rightarrow [Q(x)]]$

(54) *Every dog*
 a. $[\lambda P . \lambda Q . \forall x [[P(x)] \rightarrow [Q(x)]]](dog)$
 b. $\lambda Q . \forall x [dog(x)] \rightarrow [Q(x)]$

The lexical entry of quantificational elements like *every* would be difficult to model in the more simplistic set-approach drawn in the previous section. The same is thus true for the lexical entries one posits for other quantificational elements - for instance, aspects, which quantify over events or times, or modals, which quantify over worlds. As these elements are the type of phenomena I focus on, a function-driven approach is more appropriate (as well as more common within the semantic literature) than a sets-approach.

Before moving on to a discussion of dynamic semantic frameworks, I will introduce a standard convention used to formalize the relationship between natural language expressions and their semantic values. This is the interpretation function, $[[\cdot]]^{h,c}$. The interpretation function maps natural language expressions onto their semantic values. For an atomic natural language expression - i.e., a morpheme like “dog” - this corresponds to its lexical entry. For proper names, this corresponds to the individual the proper name refers to. This is shown below in (55):

(55) a. $[[dog]]^{h,c} = \lambda x . dog(x)$
 b. $[[hungry]]^{h,c} = \lambda x . hungry(x)$
 c. $[[love]]^{h,c} = \lambda x . \lambda y . love(x)(y)$
 d. $[[The Duke of Salford]]^{h,c} = \mathbf{s}$
 e. $[[Phoebe]]^{h,c} = \mathbf{p}$

For more complex natural language expressions - i.e., combinations of atomic natural language expressions like the VP “loves the Duke of Salford,” and the sentence “Phoebe loves the Duke of Salford,” this corresponds to the output of Function Application (or Predicate Modification, depending on what type of atomic natural language expressions are being combined) having combined the relevant atomic language expressions together. This is represented for the aforementioned VP and sentence below in (56a) and (56b) respectively.

(56) a. $[[loves the Duke of Salford]]^{h,c}$
 $= [[loves]]^{h,c} (“The Duke of Salford”)$

- $$= [\lambda x. \lambda y. \text{loves}(x)(y)](s)$$
- $$= [\lambda y. \text{loves}(s)(y)]$$
- b. $\llbracket \text{Phoebe loves the Duke of Salford} \rrbracket^{h,c}$
 $= \llbracket \text{loves the Duke of Salford} \rrbracket^{h,c}$ ("Phoebe")
 $= [\lambda y. \text{loves}(s)(y)](p)$
 $= \text{loves}(s)(p)$
 $= \text{true iff Phoebe loves The Duke of Salford}$

The superscripts ^h and ^c to the right of the interpretation function $\llbracket . \rrbracket^{h,c}$ represent PARAMETERS OF INTERPRETATION: these are elements that are always available to the semantic composition. The superscripted *h* represents an assignment function that maps (the indices on) pronouns onto individuals. The superscript *c* represents a SPEECH CONTEXT, which is a tuple that contains at least an individual, world and time, $\langle x, w, t \dots \rangle$. In unembedded cases, this is the speaker, **Sp**, the actual world **w₀** and the utterance time **t₀** i.e., $c = \langle \mathbf{Sp}, \mathbf{w}_0, \mathbf{t}_0, \dots \rangle$; unless otherwise specified, variables left unbound in a derivation are usually interpreted with respect to these parameters. For example, an unbound temporal variable will be interpreted as **t₀**, and an unbound world variable will be interpreted as **w₀**. I leave the exact specification of what a context contains unspecified, but for the purposes of this dissertation, the context also contains contextually salient past times and the Addressee.

1.3.3 Modelling Felicity: Dynamic Frameworks

The other kind of data, besides truth-value judgements, that are considered within the purview of a semantic theory, are felicity-judgements. Examples of this type of judgement are given below in (57).

(57) **CONTEXT**: We're watching Raven dance right now.

- | | |
|-------------------------------|-------|
| a. Raven is dancing | True! |
| b. # Raven was dancing | True! |

The sentence in (b) is strictly true in the given context. If Raven is, at the moment, in the process of a dancing event, then there was a previous moment (eg., two seconds before now) where he was also in the process of a dancing event. But it is strange to say (b) in the given context, where he is still dancing. This shows that even though something may be true in a given context, that does not mean that it is an acceptable utterance. The observation we can take from this data is that when a speaker knows a language, they have to know what the world would have to look like in order for a sentence to be true, but that's not *all* they have to know. They also have to know when a sentence is appropriate in a given context. The semantic framework built up in the previous subsection, as of yet, cannot account for these sorts of judgements. These sorts of frameworks are usually

called **STATIC** systems - they deal with the internal composition of a sentence. In this section I present a sketch of how such frameworks can be augmented to fit within **DYNAMIC** systems, which deal with how sentences interact with their external environment - i.e., the context. These sorts of frameworks can be used to model felicity judgements like that in (57). The discussion is largely influenced by Stalnaker (1974, 1998).

A core intuition underlying dynamic frameworks is the assumption that two speakers of a language in conversation have a common goal - to exchange information about w_0 , the actual world. Because neither interlocutor is omniscient regarding the facts of w_0 , for all the interlocutors know, there are several possible ways that the world could be. In other words, there are several possible worlds that, for all they know, could be w_0 . Imagine, for example, a simple model where worlds can only differ in three possible ways - in particular, according to whether or not the following propositions are true or false.

S_1 : Sylvester loves Phoebe.

S_2 : Edmund is hungry.

S_3 : Tom broke his leg.

There are thus $2^3 (=8)$ possible ways that the actual world might be, as specified in Table 1.8.

S	w ₁	w ₂	w ₃	w ₄	w ₅	w ₆	w ₇	w ₈
S_1	0	1	1	1	1	0	0	0
S_2	0	1	0	0	1	1	1	0
S_3	0	1	0	1	0	0	1	1

Table 1.8: W (simplified model)

If the interlocutors know nothing, then all of the worlds, from w_1 to w_8 , are compatible with what they know. In other terms, all of the worlds from w_1 to w_8 are (for all they know) the actual world. If on the other hand, both interlocutors know that Tom indeed broke his leg, then the only worlds compatible with what they know are worlds w_2, w_4, w_7 and w_8 . This set of worlds - the worlds that could be, for all the interlocutors know, the actual world - is termed the ‘context set’ (Stalnaker, 1974, 1998). The related set of propositions that the interlocutors agree on as true is termed the **COMMON GROUND** (Stalnaker, 1974, 1998).¹³ The aim of a conversation, in a dynamic approach, is to eliminate as many worlds as possible from the context set - by doing this, the interlocutors begin to approach a state of perfect knowledge regarding the actual world. An interlocutor thus utters assertions with this aim; an assertion that “Edmund is hungry” has the effect of removing worlds from the context set. If we start off in a state of total ignorance, this removes

13. I have cited Stalnaker (1974, 1998), who defined the term, although he credits Grice for first using it during his William James lectures.

worlds w_1, w_3, w_4 and w_8 from the context set $\{w_1, w_2, w_3, w_4, w_5, w_6, w_7, w_8\}$, yielding $\{w_2, w_5, w_6, w_7\}$ as our new context set. If we start off knowing that Tom broke his leg, then asserting “Edmund is hungry” removes worlds w_4 and w_8 from the context set $\{w_2, w_4, w_7, w_8\}$, yielding $\{w_2, w_7\}$ as our new context set.

Now consider the infelicity of (57b) “Raven was dancing” in a context where we see Raven in the process of dancing. The felicitous (57a) “Raven is dancing” asymmetrically entails the truth of (57d); if “Raven is dancing” is true, then we know that “Raven was dancing” is also true, but if “Raven was dancing” is true, it does not follow that “Raven is dancing” is true.¹⁴ Asserting (57a) thus allows the interlocuters to remove more worlds from the context set than asserting (57b) would. The infelicity associated with violating a Gricean Maxim like Quantity, as in (57b), is thus modelled in this dynamic framework - asserting (57b) in a context where one has sufficient evidence to utter (57a) is contrary to the underlying goal of eliminating as many worlds as possible from the context set. Now consider the original example for infelicity, repeated in (58a).

(58) **CONTEXT** Phoebe feels terrible for having written Sylvester as the villain of her gothic novel, especially since Sylvester’s widowed sister-in-law, Lady Ianthe, was inspired by Phoebe’s novel to steal Sylvester’s ward, Edmund, away to France. She could exclaim:

a. # If I cast Sylvester as the villain of my novel, Lady Ianthe will think to steal Edmund away to France!

Infelicitous!

b. If I hadn’t cast Sylvester as the villain of my novel, Lady Ianthe would never have thought to steal Edmund away to France!

Felicitous!

Abstracting away from morphological complexities, we could adopt an analysis whereby the *will* in the indicative conditional (58a) is associated with a truth-conditional semantics as below:¹⁵

(59) $will(P)(\mathbf{w}_0)(\mathbf{t}_0)$ is true iff all worlds, w' , compatible with the facts in \mathbf{w}_0 at \mathbf{t}_0 , are worlds such that P obtains in w' at some time t' following \mathbf{t}_0

14. Thus “Raven was dancing” may, via scalar implicature, imply that “Raven is dancing” is not true (cf. Thomas (2012) and references therein).

15. An analysis that can also account for the morphological complexities would be preferred. However, because there is no guarantee that the morphology-semantics interface has a 1:1 mapping, approaching the problem of compositional semantics from the top-down (i.e., determining the semantics of the whole construction before attempting to determine whether the semantics of the whole construction can be decomposed into the semantics of the morphological parts) is more productive than approaching from the bottom-up (i.e., attempting to determine the semantics of the morphological parts, and using that to try to determine the semantics of the whole). This also follows from methodological issues - while we can directly ask a language consultant for truth and felicity judgements for a sentence, and thus gauge what sort of semantics is associated with a particular construction, asking a consultant for meaning judgements for morphological parts, to try and gauge what sort of semantics is associated with each bit, is problematic (cf. Matthewson (2004)).

Given the context in (58), however, P (that Lady Ianthe thinks to steal Edmund away to France) has already obtained in w_0 (and thus in all w' compatible with w_0) - this means that P is not something that can obtain at some t' after t_0 . The consequent proposition "Lady Ianthe will think to steal Edmund away to France" is thus incompatible with the worlds in the context set at t_0 ; adding it to the common ground would result in **THE ABSURD STATE**, whereby no possible worlds are compatible with what we have asserted about w_0 . This can account for (at least one facet of) the infelicity of (58a).¹⁶

Dynamic systems such as described above essentially impose structure on the discourse, in the form of proposition sets. The utterances of the interlocutors function to modify this structured discourse: assertions are added to the set of propositions known as the common ground, and this has the effect of removing worlds from the set of worlds known as the context set. Modes of speech other than assertion, such as questions and commands, are added to correlating proposition sets in the discourse. For example, questions contribute to a **QUESTION UNDER DISCUSSION** set (Roberts (1996)), and imperatives contribute to a **To-Do-List** (Portner (2007)).¹⁷ The effect of most utterances, then, in this type of framework, is a modification of the structured discourse context (hence the description of dynamic systems whereby the meaning of a sentence is not defined as its truth-conditions, but its context-change potential (Heim (1983)). Lexical entries, then, are not restricted to making reference to elements in the domains of simplex/atomic types, as in (60), or the elements in the domains of complex/functional types, as in (61). They may also make reference to sets of propositions, like those listed in (62).¹⁸

(60) Ontology (Atomic Types)

- | | | |
|----|-------------------------------------|------------------------|
| a. | $D = \{a, b, c, \dots\}$ | (individuals, type e) |
| b. | $T = \{0, 1\}$ | (truth-values, type t) |
| c. | $I = \{t_1, t_2, t_3, t_4, \dots\}$ | (times, type i) |
| d. | $E = \{e_1, e_2, e_3, e_4, \dots\}$ | (events, type l) |
| e. | $W = \{w_1, w_2, w_3, w_4, \dots\}$ | (worlds, type s) |

16. The *would* in (58b), on the other hand, we would propose to have distinct truth-conditions from *will*, truth-conditions distinct enough so that the assertion of (58b) is not subject to this problem which leads to the absurd state. Although a lot can be (and has been) said about the semantics of counterfactual conditionals like (58b), I will abstract away from these issues for now. I return to this issue in chapters 5 and 7.

17. Of course, most analyses of questions are such that questions do not denote propositions, but sets of propositions, or partitions of the context set. As such the Question-Under-Discussion set would actually be a set of sets of propositions. And Portner (2007) technically formalizes the To-Do-List as a set of properties, and not a set of propositions. I will abstract away from this for now, but come back to the latter issue in chapter 8.

18. Although I have not yet introduced them, I have listed various types of modal bases (mb) and ordering sources (os) in (62). Modal bases and ordering sources are introduced in chapter 3.

(61) Ontology (Complex Types/Functions)

- a. $D_{\langle\langle e, t \rangle, e \rangle} = \{f, f', f'', \dots\}$ (choice functions)
- b. $D_{\langle e, t \rangle} = \{g, g', g'', \dots\}$ (individual properties)
- c. $D_{\langle i, t \rangle} = \{h, h', h'', \dots\}$ (temporal properties)
- d. $D_{\langle s, t \rangle} = \{p, q, r, s, \dots\}$ (propositions)
- e. ...

(62) Expanded Ontology (Discourse Structures/Sets)

- a. common ground (cg) = $\{p, q, r \dots\}$
- b. question-under-discussion (qud) = $\{O, P, Q\}$
- c. to-do-list (tdl) = $\{p, q, r \dots\}$
- d. modal base (mb)_{epist} = $\{p, q, r \dots\}$
- e. modal base (mb)_{circ} = $\{p, q, r \dots\}$
- f. ordering source (os)_{deontic} = $\{p, q, r \dots\}$
- g. ordering source (os)_{bouletic} = $\{p, q, r \dots\}$
- h. ...

Lexical items can then place restrictions on what these sets must look like (in terms of what sorts of propositions must, or must not be contained within them), or can contain instructions regarding which set the lexical items' host sentence should be incorporated into. Utterances that ignore these restrictions (i.e., are uttered into contexts not satisfying the relevant lexical items' restrictions), are deemed infelicitous. For example, abstracting away from many of the complex issues in the literature, we might assume that counterfactual conditional constructions, like that exemplified in (58b), are associated with a restriction that the antecedent proposition (that Sylvester wasn't cast as the villain of Phoebe's novel) is incompatible with the propositions in the common ground at t_0 .

One final architectural issue to address is how temporal variables in the static and dynamic systems crosscut. The majority of dynamic frameworks abstract away from proposition-internal temporal variables, using timeless propositions as primitives, even as they model how proposition sets in the discourse change over time. Thus we talk about the common ground at a given time, say t_0 , versus the common ground at a previous time. Static frameworks also rely on times - the content of an utterance is judged as true or false given an evaluation time that is situated with respect to the time of utterance.¹⁹ As the discourse progresses, however, we can no longer take the deictic t_0 as the index for that utterance's evaluation time, and still necessarily maintain the truth of that utterance's propositional content within our shared beliefs. Assuming that we want to maintain these truth-values, I suggest modelling this by having the propositional content of

19. Assuming semantically tensed languages.

former utterances (i.e., the propositions in the common ground) temporally indexed with respect to a repository of former utterance times, as in (63h) below.

(63) Expanded Ontology (Discourse Structures/Sets) (revised)

- a. $cg = \{p, q, r \dots\}$
- b. $qud = \{O, P, Q\}$
- c. $tdl = \{p, q, r \dots\}$
- d. $mb_{epist} = \{p, q, r \dots\}$
- e. $mb_{circ} = \{p, q, r \dots\}$
- f. $os_{deontic} = \{p, q, r \dots\}$
- g. $os_{bouletic} = \{p, q, r \dots\}$
- h. $\mathcal{T} = \langle \dots, t_{0-4}, t_{0-3}, t_{0-2}, t_{0-1} \rangle$
- i. ...

To summarize, in this section I have outlined what I view as the goals of a semanticist, and have sketched a template for the sort of framework I develop for Blackfoot in the upcoming chapters, in order to achieve these goals.

1.4 From Elicitation Judgements to Data Points

The majority of the data presented in this dissertation represent original fieldwork by the author. The data was gathered via a qualitative interview-like process referred to as CONTROLLED ELICITATION (Samarin (1967), Labov (1972)). This consists of the researcher asking a fluent speaker of the language for translations from English to Blackfoot, as well as asking the speaker for meaning judgments for researcher-constructed Blackfoot. The meaning judgments tasks were constructed following (Matthewson (2004)), where the elicitor first provided the consultant with a context (either verbally, or supplemented with visual cues like pictures or a storyboard (Burton & Matthewson (2011))), and then provides a constructed Blackfoot utterance. The elicitor then asks whether the utterance in question is (i) true and/or (ii) appropriate in the given context.

One thing not always transparent in theoretical papers is the process by which the data presented is derived from the actual elicitation process. Because different researchers may take different approaches in the conversion from elicitation judgements to the presentation of data, in this section I present some details about how I have approached this.

The data is presented, as is standard for Algonquian linguistic research, in a four-line format like (64). The first line is an orthographic representation, based, for the most part, on the orthographic

system used in Frantz (2009) and Frantz & Russell (1995).²⁰ This system is largely phonemic; purely allophonic processes are not represented, although other morphophonological processes like neutralization are represented.²¹ I use parentheses to indicate optionality, where a judgement of "optionality" means that both the form with and without the material in parentheses were presented to the consultant and judged as grammatical/felicitous/true, etc.

- (64) *nimáátsinowawaatsiksi* *annahk Michael*
 ni-máát-ino-a-waatsiksi *annahk Michael*
 1-NEG-SEE.VTA-LOC:3-3:nonaff.sg DEM Michael
 'I didn't see Michael.'
BB: You use the *waatsik* when you're emphasizing.

The second line is the underlying morpheme breakdown, where the effects of the aforementioned morphophonological processes are undone. The third line is the gloss. The morpheme breakdown and glossing provided is a compromise between my analytical preferences and convenience, where very often convenience wins out. The breakdowns and glossing should thus not be taken as serious analytical claims. For instance, I usually represent demonstratives as simplex elements in the morpheme breakdown. This is not because I don't think they can be broken down into smaller morphemes,²² but rather because the internal structure of demonstratives is largely irrelevant for my goals here, and because it allows the relatively long data examples to take up less space. Similarly, although I may believe (and in fact argue that) the underlying meaning of a specific morpheme differs substantially from the dictionary entry provided by Frantz & Russell (1995), I often adopt glosses based on the entry in Frantz & Russell (1995) in order to maintain consistency with other Blackfoot researchers.

The same proviso should be applied even more strongly to the translations, which are given on the fourth line. In fact, the majority of translations presented here are direct quotes of the translations offered by the language consultant during elicitation, as opposed to translations provided by the researcher.²³ Thus while a translation may seem to imply, for instance, the adoption of the Pronominal Argument Hypothesis, the translations should not be taken as analytical claims. This methodology of providing translations often results in translations into non-standard English; I have opted to preserve the original translations intact, as opposed to converting them into standard English.

20. I differ from the orthographic system in that I do not represent unpronounced morphemes (like obviative *-wa*, see chapter 2) in the orthographic representation. I do represent these in the second line - i.e., the underlying morphological representation.

21. Thus while allophonic [i] and [ɪ] are always represented as the underlying phonemic /i/ (*i* in the orthography), orthographic *ts* may correspond to either the underlying affricate /tʃ/ or underlying /t/ that has undergone an affrication process. The orthography thus does not always represent a 1:1 mapping to the underlying phonemes.

22. In fact, I am quite sure that they can be.

23. The remaining minority of the provided translations were offered by the elicitor, and accepted by the consultant as a valid translation.

Finally, in quite a few cases I have provided consultant comments as a fifth line. These comments are also direct quotations (or abridged versions thereof). As these comments are sometimes subject to code-switching, or are simple Blackfoot comments, the reader should be armed with the word most commonly encountered (and thus first memorized) by a beginning Blackfoot fieldworker who presents their consultant with constructed utterances: *saa* means 'no.'

Chapter 2

Blackfoot Basics

Ki ma nínaa ki mi aakíkoan itaaníistsi “Nisto nitáaksikayissoo. Nitáaksspomoo; kitáakitanáákoomo” Ki ma nínaa isspomoo. Stammaanista’psiirwa’si nató’si.”

And the man told the girl, “Myself, I will go ahead of you. I will go up to the sky; I will light your way.” And the man went up to the sky. He became the sun.

Blackfoot Creation Story, Bullshields et al. (2013)

Blackfoot is a Plains Algonquian language spoken on three reserves in Canada and one reservation in the US.²⁴ The three reserves are in southern Alberta - the Siksiká reserve (Siksika 146 IRI), the Kainaa (or Blood) reserve (Blood 148 IRI), and the Piikani (or Peigan) reserve (Piikani 147 IRI). The Blackfeet reservation is in northwestern Montana (Frantz (2009)). As of the 2011 Canadian census, there were approximately 3250 speakers of Blackfoot in Canada, with another 100 speakers in the US (Ethnologue (2013)).



Figure 2.1: Map Indicating Alberta, and the General Geographic Region where Blackfoot is Spoken (circle) (created via Google Maps. Search Term: “Canada.” Google, 17 October 2013. Web; annotations (Alberta and Blackfoot areas) by the author.)

Blackfoot is classified as EGIDS level 7 - shifting - which means that although there are still native speakers, there is currently no transmission of the language to children (Ethnologue (2013)). The majority of speakers are over the age of 60, and are bilingual, also speaking English. There is a grammar and dictionary (Frantz (1991, 2009), Frantz & Russell (1995)), collections of older grammars and texts (Uhlenbeck (1938), Taylor (1969), and Uhlenbeck (1911), Uhlenbeck (1912),

24. The term ‘reserve’ is used in Canada; ‘reservation’ is used in the US.

Josselin de Jong (1914)), as well as early-education materials (Tailfeathers (1993)).

The speaker that I work with is a female in her late 60s, from the Blood/Kainaa Reserve outside of Lethbridge (figure 2.2). She was a monolingual Blackfoot speaker until age 7, when she was required to attend St. Paul's residential school in Cardston. She was allowed to return home during the summers, however, where she would rebegin speaking Blackfoot and learn more about the language from her grandfather. She has been working with linguists at the University of British Columbia for 15 years (since 1998), where she served as the language consultant for three field methods classes (1998-1999, 2004-2005, 2011-2012). She is thus an experienced language consultant. And although she has had no systematic, formal training in linguistics, she is a natural linguist in the sense that she is interested in examining her own language, often spontaneously volunteering opinions about various parts of the language and spontaneously providing her own contexts to replace the contexts in infelicitous context-utterance pairs constructed by the elicitor. She is thus particularly suited for semantic fieldwork. Her comments on elicited constructions/judgements are always notated beneath the data examples, with her initials, **BB**, as below.

(65) **Context:** I made a sandwich especially for my dad, and hid it in the fridge, telling only him where it was. When I come home, it's gone. I figure:

aahkamyoowatoom annihkayi po'tstákssini
aahkam-Ioowatoo-m annihkayi po'tstákssini-yi
EPIST-eat.VTI-3:0 DEM sandwich

'He must have eaten the sandwich.'

BB: 'Cause in this case you're guessing. Him being the only one to know where it was and how it's gone, so naturally, you're gonna think that he ate it.

The goal of this chapter is to present a basic semantic framework for Blackfoot, against which the primary data presented in chapters 4, 5, 6 and 7 will be assessed. This section is organized into three parts. The first part is a brief grammatical sketch of Blackfoot. This will be followed by some literature review (section 2.2), focusing on previous empirical work looking at Blackfoot semantics. This will cover Chin (2008)'s investigation of aspectual classes in Blackfoot, Dunham (2008)'s work on the Blackfoot imperfective *á-*, and Reis Silva & Matthewson (2008)'s work on semantic tense. The final part of this chapter provides an outline of how the grammatical properties mentioned in the previous parts of this chapter can be accounted for within a consistent semantic framework.²⁵

25. With some annotations of how I will abstract away from various grammatical properties that I deem outside of the scope of this dissertation.

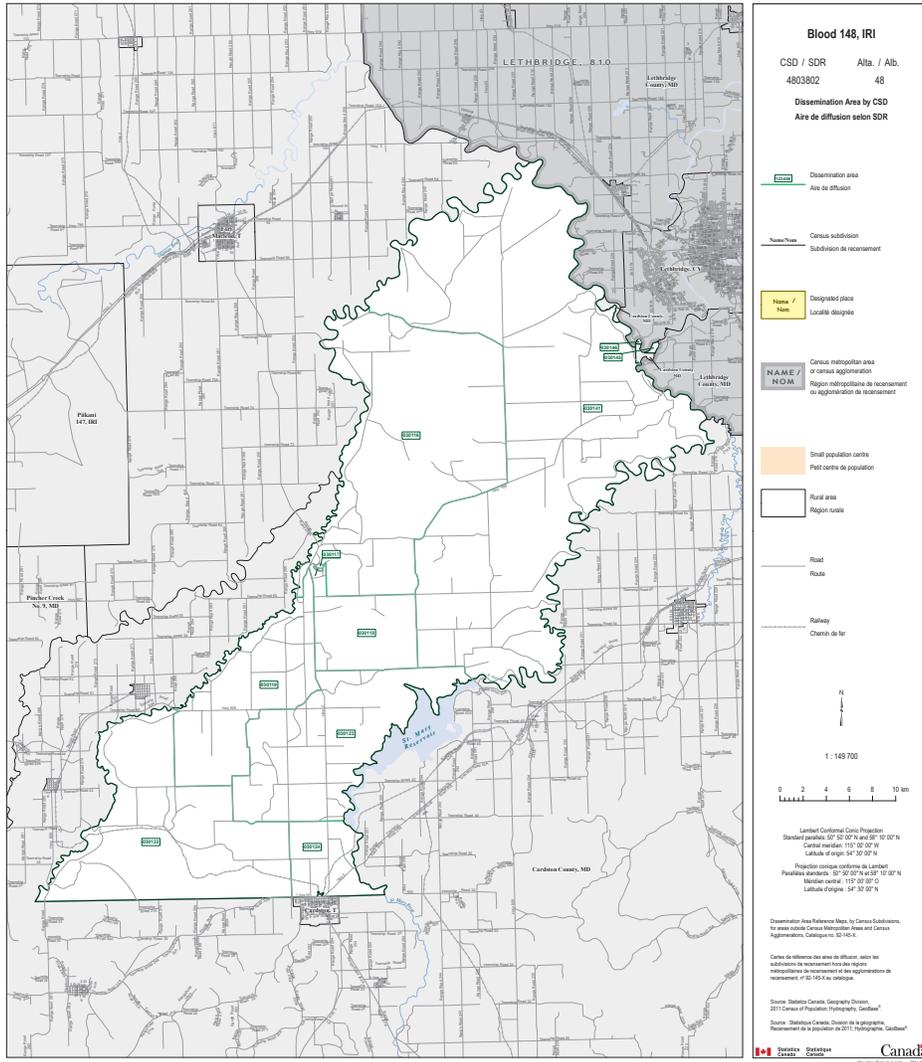


Figure 2.2: Map of the Blood Reserve, in Southern Alberta (Blood 148, IRI), Statistics Canada, Geography Division, 2011 Census of Population; Hydrography, GeoBase

2.1 A Grammatical Sketch of Blackfoot

2.1.1 The Nominal Domain

Noun Stems

As is the case for all Algonquian languages, Blackfoot nominal stems can be divided into two morphological classes - animate and inanimate (Bloomfield (1946), Hockett (1966)). These classes broadly follow the real-world division between sentient and non-sentient entities, but there are several exceptions. These exceptions are always one-way - while sentient entities are always classified as animate, some non-sentient entities are likewise classified as morphologically animate. Examples of animate and inanimate nouns are given in Table 2.1.

ANIMATE

<i>imitaa</i>	dog
<i>poos</i>	cat
<i>piitaa</i>	eagle
<i>aawápsspiinaosa'sa'tsis</i>	(a single pair of) eyeglasses
...	

INANIMATE

<i>aohkíi</i>	water
<i>asóka'simii</i>	dress/clothing
<i>imistsíłhkiitaa</i>	frybread
<i>isttsomo'kaan</i>	hat
...	

Table 2.1: Singular Animate and Inanimate Nominals

Morphological animacy is a distinction that pervades the Blackfoot grammar. In the nominal domain, the number marking that appears on the nominal stems, as well as the number marking that appears on determiners/demonstratives, inflects for the animacy of the nominal stem. In the verbal domain, transitive verb stems inflect for the animacy of their complement. An illustration of how number inflects for animacy is given in Table 2.2. All nouns (animate or inanimate) inflect for number, but the morphological marking differs depending on whether the nominal is animate or inanimate: the plural animate morpheme is *-iksi*, and the plural inanimate morpheme is *-istsi*.

PLURAL ANIMATE

<i>imita-iksi</i>	dogs
<i>poos-iksi</i>	cats
<i>piita-iksi</i>	eagles
<i>aawápsspiinaosa'sa'tsis-iksi</i>	(pairs of) eyeglasses
...	

PLURAL INANIMATE

<i>aohkí-istsi</i>	waters
<i>asóka'sim-istsi</i>	dresses
<i>imistsíhkiitaan-istsi</i>	(pieces of) frybread
<i>isttsomo'kaan-istsi</i>	hats
...	

Table 2.2: Plural Animate and Inanimate Nominals

Animate nouns further inflect for obviation. Thus an animate noun can be marked as either proximate or obviative, where we could say that a noun marked proximate roughly corresponds to the more discourse-prominent entity, and a noun marked as obviative to the less discourse-prominent.²⁶ Proximates are marked with a suffix *-wa*; obviatives are marked with *-yi*.²⁷ Note that the obviation distinction is obscured for plural nouns; *-iksi* marks both proximate and obviative (animate) plurals. This is an area where Blackfoot differs from other Algonquian languages, where it is number that is obscured for obviative nouns - i.e., in other Algonquian languages, an obviative noun does not morphologically contrast singular/plural forms.

PROXIMATE

<i>imitaa-wa</i>	dog _{PROX}
<i>poos-a</i>	cat _{PROX}
<i>piitaa-wa</i>	eagle _{PROX}
<i>aawápsspiinaosa'sa'tsis-a</i>	(a single pair of) eyeglasses _{PROX}

OBVIATIVE

<i>imitaa-yi</i>	dog _{OBV}
<i>poos-i</i>	cat _{OBV}
<i>piitaa-yi</i>	eagle _{OBV}
<i>aawápsspiinaosa'sa'tsis-i</i>	(a single pair of) eyeglasses _{OBV}

Table 2.3: Proximate and Obviative Animate Nominals

26. Readers familiar with Algonquian will be aware that this vastly oversimplifies the issue of obviation. Because this complex issue is orthogonal to the data I am concerned with, however, I will ignore the issue of what exactly the morphological proximate/obviative distinction maps onto. See Bliss (2013) for further discussion.

27. In general, glides only surface in intervocalic positions in Blackfoot. Exceptions arise for my consultant with clitics (e.g., the third person PL clitic *yaawa-* at the right edge of the verbal complex).

Nominal Inflection	Singular	Plural
Animate	-wa _{proximate} , -yi _{obviative}	-iksi
Inanimate	-yi	-istsi

Table 2.4: Nominal Inflection: Animacy, Number and Obviation

Determiners/Demonstratives

Blackfoot determiners encode information regarding the proximity and familiarity between the determiner’s complement and various speech act participants. The relevant determiner bases²⁸ are listed in below in Table 2.5, reproduced from Frantz (2009, pp.64). Note that Frantz (2009) labeled these determiners as demonstratives. Because I am not concerned with the distinction between determiners and demonstratives, I will arbitrarily use the term ‘determiner’ to refer to these elements, acknowledging that it is unclear how they should be grammatically categorized (see Bliss (2013) for discussion). These determiners inflect for the animacy and obviation status of their complement, with the same morphological reflexes as the nominal stems (i.e., as per Table 2.4).

Base	Proximity/Familiarity encoded
<i>amo</i>	proximity to speaker, but not addressee
<i>om</i>	proximity to neither speaker nor addressee
<i>anno</i>	proximity to speaker, and proximity or familiarity to addressee
<i>ann</i>	proximity or familiarity to addressee, but no proximity to speaker
<i>am</i>	proximity and familiarity to the speaker

Table 2.5: Determiner Bases

Blackfoot common nouns cannot appear as the morphosyntactic arguments of verbs unless properly escorted by a determiner (Glougie, 2000, p.8).²⁹ An example of this is shown by the grammaticality contrast between (66a), where the argument is a DP, and (66b), where the argument is a bare nominal.

- (66) a. *oma imitaa iikska’si*
om-wa imitaa-wa ii-okska’si-wa
DEM-3.PROX dog-3.PROX ic-run.VAI-3.PROX
‘That dog ran.’

28. These are ‘bases’ because they can take various suffixes related to notions of whether the entity being referred to is moving towards/away from the speaker, or whether the referred-to entity is immediately present in the context, etc.

29. By ‘morphosyntactic argument’ I mean an argument that is referenced by morphology on the verbal complex - there are certain morphosyntactically intransitive verb stems which can appear with a nominal complement. Unlike the morphosyntactically transitive verb stems, which take DP complements and inflect for the animacy/person/number of the DP complement, these “intransitive” verbs only take bare (or numerally-modified) nominals as complements, and show no animacy/person/number inflection. Section 2.1.2 describes the pattern in more detail. One exception: bare plurals, if interpreted generically, can also act as morphosyntactic arguments - i.e., as the complement of a morphosyntactically transitive verb, triggering verbal inflection.

- b. **imitaa iikska'si*
 imitaa ii-okska'si-wa
 dog ic-run.VAI-3.PROX
 Target: 'That/a/some dog ran.'

Proper names, with a few exceptions, likewise require determiners in order to appear as the argument of verbs.³⁰ An example of this is given in (67).

- (67) a. *anna Pookaakii iikska'si*
 ann-wa Pookaakii ii-okska'si-wa
 DEM-3_{prox} Pookaakii ic-run.VAI-3_{prox}
 'Pookaakii ran.'
- b. **Pookaakii iikska'si*
 Pookaakii ii-okska'si-wa
 Pookaakii ic-run.VAI-3_{prox}
 Target: 'Pookaakii ran.'

Nominal Quantifiers (or the paucity thereof)

There are few candidates for nominal quantifiers in Blackfoot. The best candidates are numeral modifiers. Nominal modifiers appear before the nominal and after a determiner, and if the numeral is higher than *ni'tokska* "one," plural morphology may or may not appear.³¹

- (68) a. *niyookskaami(ksi) poosiksi*
 niyookskaM-(iksi) poos-iksi
 three.VAI-(PL) cat-PL
 'Three cats'
- b. *omiksi niyookskaami(ksi) poosiksi*
 om-iksi niyookskaM-(iksi) poos-iksi
 DEM-PL three.VAI-(PL) cat-PL
 'Those three cats'

Other types of nominal quantification are expressed in the verbal domain. For instance, universal quantification is done by means of the preverbal morpheme *ohkan-*. Like English *all* it

30. For instance, the trickster *Naapi* does not require a determiner, nor do other unique entities from creation myths like the sun, *Nato'si*, the moon *Ko'komiki'sommi*, etc.

31. Despite the fact that I have conducted fieldwork research specifically on this issue, whether the presence or absence of plural morphology on the numeral modifier is conditioned by morphosyntactic factors or has a semantic effect is still a mystery.

associates with a plural nominal, but like English *every* it can produce variable-bound readings, as shown in (69).³²

(69) *ómiksi nínaiksi iihtohkanáyisstsiniyaa*
om-iksi ninaa-iksi iiht-**ohkana**-yisstsini-m-yaawa
DEM-PL man-PL means-**all**-cut.VTI-3:0-3pl

óttowan omi pisatsskiitaan
ot-isttowan om-yi pisatskiitaan
3poss-knife DEM-0 cake

‘Every man_i used his _{ij} knife to cut the cake.’

2.1.2 The Verbal Domain

Blackfoot is a polysynthetic language. As such, the verbal complex encodes a large array of information. A simplified verbal template is given in (70).

(70) person prefixes-(preverbs-)[verb stem]-(theme)-clause type-prox/obv

The core of the verbal complex is the verb stem. Because readers unfamiliar with Algonquian morphology may find the morpheme breakdowns in the examples curious or confusing, I will first give a brief explanation of the combination of prefixes and suffixes that attach to the verb stem. Verbal agreement morphology consists of the following: (i) person prefixes/proclitics, (ii) theme suffixes, and (iii) proximate/obviative suffixes. The person prefixes/proclitics (*nit-* for a first person, *kit-* for a second person, and $\emptyset_{\text{prox/obv}}$ for a third person) always appear leftmost in a verbal complex, separated from the verb stem by any preverbal elements that may be present. The term ‘preverb’ is a traditional Algonquianist term referring to anything to the left of the verbal stem, but excluding the person prefixes. The majority of the elements I discuss (i.e., modals and aspects) in this dissertation are situated within this preverbal domain. Third person arguments are also associated with the proximate suffix *-wa* (or the obviative equivalent *-yini*), which appears rightmost in a verbal complex, after the so-called theme suffixes, which appear directly to the right of the verb stem.³³ I gloss these theme suffixes as X:Y, where X indicates the actor, and Y indicates the patient. The gloss ‘loc’ indicates a LOCAL person - i.e., either first or second person. Thus LOC:3 indicates a first or second person acting on a third person, 3:0 indicates a third person acting on an inanimate, etc. I now turn to a description of the verbal stem.

32. The preverbal morpheme *waaka-* is listed in Frantz & Russell (1995) as “many,” however I have not found it to be very productive in elicitation contexts. There are examples of it occurring with negation, however, to yield something like ‘few.’

33. The reader may notice that the verbal proximate suffix *-wa* looks just like the nominal proximate suffix *-wa*. Bliss (2013) analyzes both forms as a single morpheme that is category neutral in that it can apply to either the verbal or nominal domain.

The Verb Stem: Morphosyntactic Verb Classes

Algonquianists divide the verb stem into three distinct portions: initial, medial and final.

(71) The Verb Stem

INITIAL - MEDIAL - FINAL

The 'initial' is essentially the verb root. It contains the lexical information (e.g., whether the verb means "dance," "slice," "eat," etc.). Medials (less common in Blackfoot than in other Algonquian languages) encode incorporated nominal elements (e.g. "by hand," "by mouth") . Finals encode, as is characteristic among Algonquian languages, a four-way division categorized by transitivity and animacy (Bloomfield (1946), Goddard (1967, 1974)). These are listed below:

1. Animate Intransitive (AI)
2. Inanimate Intransitive (II)
3. Transitive Animate (TA)
4. Transitive Inanimate (TI)

The first two designations, AI (animate intransitive) and II (inanimate intransitive), are types of intransitive verbs. These categories differ according to whether the single argument they take (the subject) is morphologically animate or inanimate respectively. The II verbs are the simplest. While the inanimate subject must either be (i) a DP/numerally-modified nominal (cf. Weber & Matthewson (2013)), or (ii) a previously mentioned/salient entity, the verb requires no agreement morphology beyond a third person suffix *-wa*. Examples of II verbs in action are given below.

(72) a. *iihkitsiwa*

ii-ihkitsi-wa

ic-dry.vII-3

'It dried.' (Frantz & Russell (1995))

b. *iikíitsiksista'piiwa amoyi pásskaani*

iik-iitsiksista'pii-wa am-oyi passkan-yi

INTS-be.slow.vII-3 DEM-0 dance-0

'This dance is very slow.' (Frantz & Russell (1995))

c. *ko'takáani akaiitsskihkaawa*

k-o'takaan-yi akaa-iitsskihkaa-wa

2-hair-0 PERF-become.matted.vII-3

'Your hair has become matted.' (Frantz & Russell (1995))

d. *áóhpotaa*

á-ohpotaa-wa

IMPF-SNOW.vII-3

'It is snowing.' (Frantz & Russell (1995))

Weather verbs are an exception to the requirement for an overt subject or previously-mentioned entity: they do not appear compatible with overt DP subjects (as shown by the ungrammaticality of 73).³⁴

- (73) **omi koonsko áóhpotaa*
omi koonsko-yi á-ohpotaa-wa
 DEM SNOW-0 IMPF-SNOW.VII-3

Target: ‘The snow is snowing/It’s snowing.’

Animate intransitive (AI) verbs are slightly more complicated than II verbs in their morphology, in that they inflect for the person of their single animate argument (*nit-* for a first person, *kit-* for a second person, and *-wa* or *-yini* for proximate and obviative third persons respectively). They are also slightly more complicated in that AI verbs further divide into two subcategories. There are true AI intransitives, which are semantically and morphologically intransitive. Examples of this are given below.

- (74) a. *ihpiyi vai*; “dance”
 b. *okska’si vai*; “run”
 c. *aawapsspiinao’si vai*; “wear eye-glasses”
 d. *iiniitsi vai*; “drown”
 (cf. *iinitsim vta*; “drown (someone)”, *iiniitstoo vii*; “submerge”)

- | | | | | | |
|---------|--|----|--|----|--|
| (75) a. | <i>nitsspiyi</i>
nit-ihpiyi
1-dance.VAI
‘I danced.’ | b. | <i>kitsspiyi</i>
kit-ihpiyi
2-dance.VAI
‘You danced.’ | c. | <i>ihpiyii</i>
nit-ihpiyi-wa
dance.VAI-3
‘He danced.’ |
|---------|--|----|--|----|--|

The other category of AI verbs are semantically transitive. Frantz (2009) calls these paratransitive, Frantz (1970) calls them pseudotransitive, and traditional Algonquianist terminology (i.e., Bloomfield (1946), Goddard (1967, 1974)) terms these as AI + O verbs. Examples of these are given below.

- (76) a. *ooyi vai*; “eat (something)”
 (cf. *oowat vta*; “eat DP_{AN}”, *oowatoo vti*; “eat DP_{IN}”)
 b. *ohpommaa vai*; “buy (something)”
 (cf. *ohpommat vti*; “buy DP_{AN}”, *ohpommatoo vta*; “eat DP_{IN}”)
 c. *inihki vai*; “sing”
 (cf. *inihkitsi vti*; sing DP_{IN}), *inihkohto vta*; “sing to DP_{AN}”)

34. Other attempts at overt subjects with targets like “The sky is snowing” and “The world is snowing” were also rejected.

Pseudotransitives, unlike canonical AI verbs, can (and often do) appear with an object nominal. Unlike morphologically transitive verbs (i.e., TI and TA verbs), however, pseudotransitives do not agree with their objects, nor do they license DP objects. Rather, pseudotransitives either appear without an overt object, or appear with a determinerless nominal. They never occur with object agreement, as shown in (77) and (78) (cf. Frantz (1991, 2009), Glougie (2000), Armoskaite (2011)).³⁵ Example (77a) shows a properly-inflected AI form of ‘eat’ *ooyi* - (77a) lacks a theme suffix and can stand alone or appear with a bare nominal like *sitokihkiitaan* ‘pie.’ This contrasts with the morphologically transitive form in (77b) - the VTI form of ‘eat’ *oowatoo* occurs with a theme suffix *-’p* and can stand alone (provided the object is previously mentioned), or occur with a full DP like *omi sitokihkiitaan* ‘that pie.’

- (77) a. *nítsooyi* (*sitokihkiitaan*)
 nit-ooyi (*sitokihkiitaan*)
 1-eat.VAI (pie)
 ‘I ate (some/a pie).’
- b. *nítsoowatoo’p* (*omi sitokihkiitaan*)
 nit-oowatoo-’p (*omi sitokihkiitaan*)
 1-eat.VTI-LOC:0 (DEM pie)
 ‘I ate it/that pie.’

The examples in (78) show that the AI form cannot take a theme suffix like *-’p* or occur with a full DP like *omi sitokihkiitaan*. (78a) shows that the AI form is ungrammatical with both agreement and an overt DP, (78b) and (78c) show that the presence of agreement alone, or an overt DP alone, are sufficient to make an AI form ungrammatical.

- (78) a. **nítsooyi’p* *omi sitokihkiitaan*
 nit-ooyi-’p *om-yi sitokihkiitaan*
 1-eat.VAI-LOC:0 DEM-0 pie
 ‘Target: I ate that pie.’
- b. **nítsooyi’p* *sitokihkiitaan*
 nit-ooyi-’p *sitokihkiitaan*
 1-eat.VAI-LOC:0 pie
 ‘Target: I ate that pie.’
- c. **nítsooyi* *omi sitokihkiitaan*
 nit-ooyi *om-yi sitokihkiitaan*
 1-eat.VAI DEM-0 pie
 ‘Target: I ate that pie.’

35. This diagnostic for AI + O verbs is Blackfoot-specific. Other Algonquian languages, like Nishnaabemwin, (Nattaya Piri yawiboon, p.c., cf. ?) allow bare nominals as arguments for any kind of verbal stem.

Pseudotransitives contrast with the morphologically transitive designations, TA and TI. These are semantically and morphologically transitive verbs. Although these verbs require two arguments, only the animacy of the direct object is relevant for the morphological categorization. This is because all subjects of transitive verbs in Blackfoot must be sentient and therefore grammatically animate. There is thus no distinction to encode with respect to the animacy of the subject, so the designations TA and TI differ according to whether the direct object they take is morphologically animate, or inanimate, respectively. TA and TI verbs always take verbal agreement morphology which indexes their arguments. These arguments are restricted to being (i) DPs/ numerally-modified nominals (cf. Weber & Matthewson (2013)) or (ii) previously mentioned/salient entities; TA and TI verbs cannot take bare nominal arguments. Examples of the relevant morphology, a combination of prefixes and suffixes, and the ungrammaticality of bare nominal arguments, are shown in (79)-(82) for a TI verb: (79) shows properly-inflected TI forms of ‘eat’ *oowattoo* - *oowattoo* always appears with theme inflection (*-p* or *-m*) and can occur with an overt DP like *omi sitokihkiitaan* ‘that pie.’ The example in (80) shows that properly-inflected TI forms cannot appear with a determinerless object, (81) shows that it is the TI form, and not merely the theme marking, that is incompatible with a determinerless object. The example in (82) shows that (81) is ungrammatical for two reasons: not only are TI stems incompatible with determinerless objects, TI stems are also ungrammatical without proper theme inflection.

- (79) a. *nitssoowattoo’p* (*omi sitokihkiitaan*) b. *íwattoo* (*omi sitokihkiitaan*)
nit-oowattoo-’p (om-yi sitokihkiitaan) ii-oowattoo-**m-wa** (om-yi sitokihkiitaan)
1-eat.VTI-LOC:0 (DEM-0 pie) ic-eat.VTI-**3:0-3** (DEM-0 pie)
‘I ate it (that pie).’ ‘She ate it (that pie).’
- (80) a. **nitssoowattoo’p* *sitokihkiitaan* b. **íwattoo* *sitokihkiitaan*
nit-oowattoo-’p *sitokihkiitaan* ii-oowattoo-**m-wa** *sitokihkiitaan*
1-eat.VTI-LOC:0 pie ic-eat.VTI-**3:0-3** pie
‘Target: I ate (some) pie.’ ‘Target: She ate some pie.’
- (81) a. **nitssoowattoo* *sitokihkiitaan* b. **íwattoo* *sitokihkiitaan*
nit-oowattoo *sitokihkiitaan* ii-oowattoo *sitokihkiitaan*
1-eat.VTI pie ic-eat.VTI pie
‘Target: I ate (some) pie.’ ‘Target: She ate some pie.’
- (82) a. **nitssoowattoo* b. **íwattoo*
nit-oowattoo ii-oowattoo
1-eat.VTI ic-eat.VTI
‘Target: I ate (something).’ ‘Target: She ate (something).’

The examples in (83)- (85) reflect the same pattern for a TA verb. (83) shows properly inflected TA forms of ‘see’ *ino*, which always appear with a direct theme suffix like *-a* or an inverse theme suffix like *ok-*. The TA form can appear with an overt DP like *omi imitaa* “that dog,” or without an overt DP if the referent was previously mentioned. (84) shows that a bare nominal is ungrammatical with a TA form; (85) shows that TA forms are ungrammatical without a theme suffix.

- (83) a. *nitsíinowa* (oma imitaa) b. *nitsíinook* (oma imitaa)
nit-ino-a-wa (om-wa imitaa-wa) **nit-ino-ok-wa** (om-wa imitaa-wa)
1-see.VTA-LOC:3-3 (DEM-3 dog-3) **1-see.VTA-3:loc-3** (DEM-3 dog-3)
 ‘I saw him (that dog).’ ‘(That dog) he saw me.’
- (84) a. **nitsíinowa* imitaa b. **nitsíinook* imitaa
nit-ino-a-wa imitaa **nit-ino-ok-wa** imitaa
1-see.VTA-LOC:3-3 dog **1-see.VTA-3:loc-3** dog
 ‘Target: I saw a dog/some dogs.’ ‘Target: A/some dog(s) saw me.’
- (85) a. **nitsíinowa* b. **nitsíinook*
nit-ino-a-wa **nit-ino-ok-wa**
1-see.VTA-LOC:3-3 **1-see.VTA-3:loc-3**
 ‘Target: I saw something/them.’ ‘Target: They/something saw me.’

The Preverbal Domain

Blackfoot is exceptional even among Algonquian languages in that other than nominals, there are very few elements that appear outside of the verbal complex. The majority of adverbial elements, whether aspectual, modal, manner-denoting, or discourse-related, appear as preverbs within the verbal complex. The preverbal domain appears directly to the left of the verb stem, and to the right of the person prefixes.³⁶ A template of the elements of the verbal complex introduced so far is given below in (86), followed by examples of verbal complexes modified by various combinations of preverbal morphemes.

- (86) prefixes-**preverbs**-[verb stem]-(theme)-clause-type-prox/obv

36. In INDEPENDENT clauses, clausal negation *máát* and Y/N question marker *(i)kata’-*, when present, appear between the person prefixes and preverbal domain, and are accompanied by NON-AFFIRMATIVE morphology that appears at the right-edge of the verbal complex (following theme suffixes, if present). These differ from other preverbal material in that their presence is conditioned by clause-type and that they are in complementary distribution with each other, where other preverbal elements do not display these restrictions.

(87) Aspectual Preverbs

- a. *nitáihpiyi*
nit-á-ihpiyi
1-**IMPF**-dance.VAI
'I am dancing/I dance.'
- b. *nikaihpiyi*
nit-ikaa-ihpiyi
1-**PERF**-dance.VAI
'I have danced.'
- c. *nítsakaihpiyi*
nit-sa:ki-á-ihpiyi
1-**still-IMPF**-dance.VAI
'I am still dancing.'

(88) Manner Preverbs

- a. *áíkkamihpiyi*
á-**ikkam**-ihpiyi-wa
IMPF-**fast**-ihpiyi.VAI-3
'He dances fast.'
- b. *áakoohkisimiohpommaa sspópi*
áak-noohk-**isimi**-ohpommaa-wa sspópi
FUT-c.exp-**secret**-buy.VAI-3 turtle
'She should buy a turtle on the sly.'
- c. *anna kaaáhsa íikssaomítomaahkaa-wa*
ann-wa k-aaahs-wa **iik-ssaomit**-omaahkaa-wa
DEM-3 2-elder.relative-3 **INTS-furtive**-drive.VAI-3
'Your grandmother drives furtively (thereby, evading those of us who are curious about where she drives to).' (Frantz & Russell (1995))
- d. *íitskimaananiwa*
iitskimaan-waani-wa
tactless-say.VAI-3
'He tactlessly said (something).' (Frantz & Russell (1995))

(89) Modal Preverbs

- a. *ninaahkama'pihpiyi*
ni-aahkama'**p**-ihpiyi
1-**might**-dance.VAI
'I might dance.'

- b. *nitohkottsspiyi*
 nit-**ohkott**-ihpiyi
 1-**able**-dance.VAI
 'I was able to dance.'
- c. *nitáákihpiyi*
 nit-**áák**-ihpiyi
 1-**FUT**-dance.VAI
 'I will dance.'
- d. *nitáákohkottsspiyi*
 nit-**áák-ohkott**-ihpiyi
 1-**FUT-ABLE**-dance.VAI
 'I will be able to dance.'
- e. *nitááksstsina'i'ihpiyi*
 nit-**áák-sstsina'**-ihpiyi
 1-**FUT-DEON**-dance.VAI
 'I have to dance.'

As shown in the examples above, the preverbal elements can stack. In general, manner preverbs appear closer to the verb stem, and modal preverbs appear closer to the person prefixes. Discourse-related preverbs seem somewhat freer in their distribution, as are aspectual preverbs.³⁷

Several elements within the preverbal domain are key players in the story that will unfold in further chapters. For example, the circumstantial modals *ohkott-*, *áak-* and *aahkama'p-* are all modal preverbs that will be discussed in chapters 4, 5, 6, and 7. The aspectual/modal preverb *á-* is similarly discussed in these chapters. Other preverbal aspects like the perfect *ikaa-* play a role in identifying the pattern underlying restrictions on Blackfoot SUBJUNCTIVE conditional antecedents; solving this puzzle is one of the goals of chapter 5. Note, however, that while many of the puzzles addressed in this dissertation are concerned with elements in the preverbal domain, I focus on how the presence/absence of these preverbal elements affects the modal and temporal meaning of Blackfoot utterances. A detailed investigation into morphological restrictions on the ordering of preverbs (and the semantic effects or lack thereof) is an issue I leave for further research. The other domain in the verbal complex playing a supporting role in this dissertation is clause-type morphology. I move on to this part of the grammatical sketch next.

37. That is, discourse-related and aspectual preverbs sometimes occur close to the verb stem and sometimes appear closer to the person prefixes (relative to the manner/modal preverbs). As of yet there hasn't been extensive research into which preverbal morphemes have fixed positions, and which do not, and whether the preverbs fall into categories according to such criteria. On the same note, my impression is that while the morphological position of the aspectual preverbs often has a semantic effect, this is not the case for the discourse preverbs. More research is required before much more can be said about the relative morphological position and scope of these elements.

Clause Type Morphology

Blackfoot has a fairly complex system of clause-typing that involves distinct ‘orders’ and ‘modes’, where these orders and modes are themselves identified by morphosyntactically-disparate exponents (cf. Frantz (1970, 1971), Déchaine & Wiltschko (2011)).³⁸ Roughly we can identify five clause-types: the INDEPENDENT, CONJUNCTIVE, SUBJUNCTIVE, UNREAL and IMPERATIVE.³⁹ Although it oversimplifies the morphology and syntax involved, we can distinguish the different clause-types with the presence of specific morphological elements in the slot as indicated in the template in (90). In what follows, I will address each clause-type separately, identifying key characteristic features.

(90) prefixes-(preverbs)-[verb stem]-(theme)-**clause type**-prox/obv⁴⁰

The INDEPENDENT Clause Type The INDEPENDENT is used for main/matrix clause assertions, and is characterized by the presence of (the previously mentioned) person prefixes. These are summarized for convenience in Table 2.6. Note that person prefixes mark arguments of the verb, but they are in complementary distribution; if the verb takes more than one argument, then the person prefix that appears is the one that is highest ranked on the Person-Animacy hierarchy given in (91).

Person Prefixes	INDEPENDENT
1ST	<i>ni(t)-</i>
2ND	<i>ki(t)-</i>
3RD _{proximate}	∅
3RD _{obviative}	<i>o(t)-</i>

Table 2.6: Person Prefixes

(91) Person-Animacy Hierarchy

$$2 < 1 < 3_{\text{proximate}} < 3'_{\text{obviative}} < 0_{\text{inanimate}}$$

A rough verbal template for the INDEPENDENT mode is provided below in (92). If there is a non 3rd-person plural argument, the number slot houses the 1st and 2nd person plural agreement morphemes *-hpinaan* and *-hpoaa* respectively, as well as the inclusive 1st person plural *o'p*.⁴¹ The

38. By ‘morphosyntactically disparate’ I mean both that (i) clause-type is morphologically reflected with a cluster of different suffixes and prefixes (i.e., multiple exponence), and (ii) the multiple elements marking the different clause-types have different morphosyntactic statuses (Frantz (1970, 1971), Déchaine & Wiltschko (2011)).

39. These terms are taken from Frantz (2009)’s Blackfoot Grammar. I will continue to use these terms although the reader should consider themselves warned that the SUBJUNCTIVE does not map onto the use of the term *subjunctive* in other languages.

40. Note that the proximate *-wa* and obviative *-yini* are restricted to INDEPENDENT clauses. Obviation does play a role in the morphology of UNREAL, CONJUNCTIVE and SUBJUNCTIVE clause-types, but this is only morphologically reflected in the form of the theme suffixes.

41. There are different ways to morphologically analyze clause-type morphology in Blackfoot. The version of the indicative template given above lacks a slot for overt indicative clause-type morphology. This is because if we treat

AGR1 slot is where the third person *-wa* is located. The AGR2 slot houses various clitic elements that further index salient third persons.⁴²

(92) Morphological Template for the INDEPENDENT

person prefixes-(preverbs)-[verb stem]-(theme)-number-AGR1-AGR2

While the INDEPENDENT is the sole clause-type used for main clause assertions, there are two distinct clause-types for dependent/subordinate clauses: the CONJUNCTIVE and SUBJUNCTIVE paradigms. I will first address the CONJUNCTIVE and then the SUBJUNCTIVE.

The CONJUNCTIVE Clause Type The CONJUNCTIVE is also characterized by the presence of the *nit-/kit-* person prefixes. Its distinguishing characteristic is the CONJUNCTIVE morphology *-hsi*, which follows the post-verbal theme suffixes.

(93) Morphological Template for the CONJUNCTIVE

person prefixes-(preverbs)-[verb stem]-(theme)-hsi-number⁴³-AGR2

The CONJUNCTIVE paradigm is used for past temporal *when*-clauses, purpose-clauses (“in order to CONJUNCTIVE clause, INDEPENDENT clause”), and most embedded complement clauses.⁴⁴ Some examples of these uses of conjunctive clauses are given below in (94).

- (94) a. *nitáihkiitatohsi omi sitokihkiitaan, kisto kitskiit pisatskiitaan*
nit-á-ihkitaatoo-hsi omi sitokihkiitaan, kisto kit-ihkitaa pisatskiitaan
 1-IMPF-bake.VTI-CJ DEM pie, 2.pro 2-bake.VAI cake
 ‘When I was cooking that pie, you made a cake.’

the forms *-hpinaan* and *-hpoaa* as unanalyzeable, there does not appear to be anything that looks like overt indicative morphology. This is compatible with an analysis where these elements either *are* indicative clause-type morphology, or an analysis where they occur with null indicative clause-type morphology. The 1st and 2nd person plural agreement morphemes *-hpinaan* and *-hpoaa*, however, seem morphologically complex, being analyzeable as *-hp +-inaan/-oaa*; the *-inaan/-oaa* appear to indicate 1st and 2nd person plural arguments in other clause-types. This suggests an analysis where the *-hp* portion of these forms is indicative clause-type morphology (agreeing with a 1st or 2nd person plural argument). This would require us to posit null \emptyset indicative morphology for singular 1st/2nd person, third person and inclusive 1st person forms. Because the particular morphological breakdown of the clause-types is orthogonal to the issues I discuss, I remain agnostic on this issue.

42. These clitic elements are not well understood, and I will abstract away from them for the most part. I gloss these as DTP, following Frantz (1991, 2009) who refers to these ‘distinct third person pronouns.’

43. As mentioned previously, proximate *-wa* does not show up in NON-INDEPENDENT verbal paradigms. Thus there is no AGR1 slot.

44. Exceptions are a few attitude predicates which take INDEPENDENT clause suffixes, and embedded \forall/N questions, which are in the SUBJUNCTIVE. The characterization of which attitude predicates take CONJUNCTIVE and which take INDEPENDENT clause complements is a question I leave for further research.

- b. *nitáí'tomaanistsskiitahpinaan sitokihkiitaan nitáakohtsitskssinai'p*
 nit-á-i'tomaanist-ihkiitaa-hpinaan sitokihkiitaan nit-áak-**oht**-it-sskssini-'p
 1-IMPF-together-bake.VAI-1pl pie 1-FUT-**means/purpose**-rl-know.VTI-LOC:0
ninaakaanistai'sohkihkiitaahsi sitokihkiitaan
 nin-aak-aanist-a'-sohk-ihkiitaa-**hsi** sitokihkiitaan
 1-N.FACT-manner-inch?-good-bake.VAI-CJ pie
 'We're making a pie together so that I will know how to make good pies.'
- c. *nitsiiksistowata annahk Monica ninaahkohkotahsi sitokihkiitaan*
 nit-iiksistowat-a ann-wa-hka Monica ni-aahk-ohkot-a-**hsi** sitokihkiitaan
 1-promise.VTA-LOC:3 DEM-3-rel Monica 1-N.FACT-give.VTA-LOC:3-CJ pie
 'I promised Monica that I would give her a pie.'

The SUBJUNCTIVE Clause Type The SUBJUNCTIVE paradigm, unlike the INDEPENDENT and CONJUNCTIVE paradigms, lacks person prefixes. Like the CONJUNCTIVE paradigm, there is characteristic morphology which follows the verb stem. Unlike the CONJUNCTIVE morphology, the SUBJUNCTIVE morphology inflects for person and number, as shown in Table 2.7. The SUBJUNCTIVE paradigm is used for the suppositional antecedents of conditionals, future temporal *when*-clauses, and present-habitual *whenever*-clauses.

(95) Morphological Template for the SUBJUNCTIVE

(preverbs)-[verbstem]-number-**SBJ**-AGR2

Clause-Type Morphology	SUBJUNCTIVE
1ST person	- <i>iniki</i>
2ND person	- <i>iniki</i>
3RD person (sg/pl)	- <i>si</i>
1ST PL EXCLUSIVE	- <i>'ki / -hki</i>

Table 2.7: SUBJUNCTIVE Morphology

An example of a SUBJUNCTIVE clause is given below in (96).

(96) **Context:** I'm reminding you of the ingredients you need

- kamihkitainiki sitokihkiitaan kitáaksstsinao'ohtsisi'tapi ímmistsi*
 kam-ihkitaa-**iniki** sitokihkiitaan kit-áak-sstsinao'-ohtsisi'tapi immistsii
 if-bake.VAI-**SBJ:loc** pie 2-FUT-have.to-use.VAI lard
 'If you make a pie, you need to use lard.'

The UNREAL Clause Type Frantz (1991, 2009) also presents what he terms the unreal paradigm. He does not classify it as either independent or subordinate; he notes that morphologically it appears nearly identical to the independent paradigm, with the addition of unreal *-Vhtopi* morphology, and he describes its distribution as occurring in counterfactual and hypothetical subordinate clauses. Note that UNREAL clauses also lack obviative/proximate morphology (AGR1). An example of an UNREAL clause is given below in (97).

- (97) *iihkitaaohtopi* *pisatskiitaan* *nisto* *nitáakoohkattsitaihkiit* *sitokihkiitaan*
 kana-ihkitaa-**ohtopi** *pisatskiitaan* *nisto* *nit-áak-noohk-matt-it-á-ihkitaa* *sitokihkiitaan*
 all-bake.VAI-UNR cake 1.pro 1-FUT-C.exp-add-RL-IMPF-bake.VAI pie
 ‘If he had baked a cake, I would have also baked a pie.’

- (98) Morphological Template for the UNREAL

person prefixes-(preverbs)-[verb stem]-(theme)-number--htopi-AGR2

The IMPERATIVE Clause Type The final clause-type to discuss is the imperative, which is used for commands/requests. Commands based on intransitive verb stems inflect for (the 2nd person subject’s) number: *-t* for a singular 2nd person and *-k* for a plural 2nd person. Commands based on transitive verb stems are more complicated, involving theme marking and number agreement to indicate the object; Table 2.8 shows the combination of morphemes that appear after the verb stem in an imperative according to the number and person of the subject and object.⁴⁵ Imperative forms are often accompanied by the preverbal morphemes *noohk-*, *stam-* and *kipp-* which Frantz (1991, 2009) characterizes as being difficult to gloss. He notes that their addition to an imperative form is functionally equivalent to adding English *please*.⁴⁶

- (99) Morphological Template for the IMPERATIVE

(preverbs)-[verb stem]-IMPV

Examples of imperatives are given below.

45. The combination of morphology appears to be somewhat complicated. Observe that the imperative morphology following the verb stem only in some cases seems to reflect theme marking - e.g., we see what looks like the inverse *-ok*, but never the direct *-a*. Further, the discussion in Frantz (1991, pp. 114) provides breakdowns as in the table above, glossing the *-i* as marking a 1st person, followed by a distinct inverse marker *-ok*. The breakdown in Frantz (2009, pp. 112), however, treats the 2s:1s and 1pl:1s inverse morphology and unanalyzeable forms *-okit* and *-okik*. It is unclear to me whether this change reflects a change in analysis or just a change in terms of what the author deemed the correct level of morphological complexity for a teaching grammar.

46. In my fieldwork I have noticed that while *noohk-* and *kipp-* indeed make the command more polite or a more nicely-phrased request, commands marked with *stam-* “just” are somewhat less polite. These preverbal morphemes can also co-occur. For example, the combination of *noohk-* and *stam-* yield something like a plea.

Subj↓: Obj →	1s	1p	3	n/a (intransitive)
2s	-ok-i-t	-ok-innaan	-(i)s	-t
2pl	-ok-i-k	-ok-innaan	-ok	-k

Table 2.8: Imperative Clause-Type Morphology: See Frantz (2009, pp. 112/153) for more discussion

- (100) a. *Miinapitsiihtaata!* *áípioksk'asi*
 miin-apitsiihtaata-**t!** á-ipi-okska'si-wa
 NEG.IMPV-WORRY.VAI-IMPV:2sg IMPF-far-run.VAI-3
 'Don't worry (about him), he runs long distance.'
- b. *inikotomos* *anniksi!*
 inihkohtomo-**s** ann-iksi
 sing.for.VTA-IMPV:2:3pl DEM-PL
 'Sing for them!'
- c. *noohksinikotomos* *anniksi!*
 noohk-inihkohtomo-**s** ann-iksi
c.exp-sing.for.VTA-IMPV:2:3pl DEM-PL
 'Why don't you sing for them?'
BB: That's a nice way of saying, like "please."
- d. *aahkayíik!*
 wahkayi-**k**
 go.home.VAI-IMPV:2pl
 'Go home!'

This concludes the basic grammatical sketch portion of this chapter. I now move on to the literature review portion.

2.2 Previous Empirical Work in Blackfoot Semantics

Although Blackfoot is a relatively understudied language, it has been the subject of a respectable amount of fieldwork-based semantics, particularly in the domain of temporality. In this section I address works particularly relevant to the empirical phenomena discussed in the dissertation. I will first address the discovery of diagnostic tests for lexical aspectual classes by Chin (2008). I then discuss Dunham (2008)'s investigation into grammatical aspect, followed by a review of Reis Silva & Matthewson (2008)'s analysis of semantic tense.

2.2.1 Chin (2008) and Lexical Aspect in Blackfoot

Vendler (1957) influentially proposed that English predicates fall into distinct classes according to their internal temporal structure, identifying a set of diagnostic tests for classification. Since then, several researchers have proposed various means of semantically formalizing the distinction between accomplishments, activities, achievements and statives (cf. Smith (1997), Parsons (1990),

Dowty (1979), Rothstein (2004)). The following descriptions of the relevant types of aspectual classes are based on the discussion in Rothstein (2004).

Accomplishments Accomplishments are predicates like 'climb a mountain,' which consist of a process with an inherent endpoint.

Activities Activities like 'dance' are likewise processes, entailing change over time, but in a cyclic manner so that they do not have an inherent endpoint. This is why even if you're interrupted when you're running, you can still say that you ran - because running is made up of lots of temporally shorter running events.

Achievements Achievements are predicates like 'reach the top.' These can be described as near-instantaneous transitions from one state to another.⁴⁷

Statives Statives are like activities in that they have no inherent endpoint, but they differ crucially in that they are non-dynamic (i.e., do not entail change over time). This property means that statives can hold true of single instants. This distinguishes them from the three eventive aspectual classes (accomplishments, activities and achievements), which are all dynamic, and therefore are only defined for intervals. This distinction between predicates which can hold true of instants, and those that are only defined for intervals is an important distinction that will be relevant for many of the phenomena addressed in later chapters.

Distinguishing aspectual classes among English predicates has proven analytically useful. Different aspectual classes interact differently with grammatical aspect (e.g. the progressive), and the differences can be seen as following directly from the distinct internal structures of the different types of predicates. One problem for extending the usefulness of Vendler's classification for crosslinguistic research, however, is that Vendler/Dowty's diagnostics are designed for English, and rely on specific lexical items of English. For instance, the distinction between accomplishments and activities relies in part on whether the predicate can be felicitously modified by *for an hour* or *in an hour*, as accomplishments can only be felicitously modified by the latter, and activities by the former. Chin (2008) investigates the question of how Blackfoot predicates can be similarly categorized. She ends up concluding that while the Vendler/Dowty diagnostics cannot be imported wholesale for Blackfoot, there are Blackfoot-specific diagnostics capable of distinguishing three distinct aspectual classes: activities, achievements and what she terms "change and state" verbs.

Chin (2008)'s diagnostics consist of testing the availability of specific readings given the addition of several different preverbal morphemes: the perfect *akaa-/ikaa-* (diagnostic 1), the imperfective

47. The near-instantaneous nature of the transition does not hold for all English predicates that are usually classified as achievements. For instance, degree achievements like 'warm (the soup)' are not near-instantaneous. This is not relevant for the data discussed in this dissertation, however, so I abstract away from the issue.

á- (diagnostic 2), *iksist-* “finish” (diagnostic 3) and *sa:ki-* “still” (diagnostic 4), where uses of *sa:ki-* additionally require the imperfective *á-* to *sa:ki-*’s immediate right. The relevant readings that are available to the different aspectual classes are summarized in Table 2.9.

Category	Activities	Achievements	Change and States
D1: <i>akaa-</i>	e ends	e ends	s begins
D2: <i>á-</i>	(i) e ongoing (ii) habit holds	habit holds	(i) s holds (ii) habit holds
D3: <i>iksist-</i>	e ends	e ends	(i) s ends (ii) habit of becoming s ends
D4: <i>sa:ki-á-</i>	(i) e ongoing (ii) habit holds	e ongoing	s still holds

Table 2.9: Chin (2008): Blackfoot-internal Diagnostics for Aspectual Classes

Although Chin (2008) does not provide any diagnostics to distinguish accomplishments from activities, Dunham (2008)’s investigation into the aspectual morpheme *á-* provides such a diagnostic. While *á-* modified accomplishments result in the **IMPERFECTIVE PARADOX**, this is not the case for activities.

The imperfective paradox is a diagnostic that Dowty (1979) used to distinguish between accomplishments and activities. It works as follows: while an in-progress assertion of an activity entails the truth of its perfective equivalent (i.e., if someone was running, then they ran), an in-progress assertion of an accomplishment does not (i.e., if someone was climbing a mountain, they didn’t necessarily climb the mountain). Now consider the following activity predicate, *ihpiyi* “dance.” The imperfective form is asserted in (101), along with an assertion that the event was not completed. This cannot be followed by the negation of the bare/perfective, as shown in (101a) - you cannot deny the perfective entailment. My consultant instead offered the negated form in (101b), where the preverb *sopok* ‘finish’ was first added to the activity in order to turn it into an accomplishment.

(101) **Context:** I’m watching So You Think You Can Dance, and the contestant does half of her dance, but then falls and hurts herself. She doesn’t finish the dance.

áihpiyi, *itsístohkohpi*
á-ihpiyi-wa, *it-istohkohpi-wa*
IMPF-dance.VAI-3, rl-fall.VAI-3

‘She was dancing, then she fell.’

a. # *máátspiyyítwaatsiksi*
máát-ihpiyi-waatsiksi
NEG-dance.VAI-3:nonaff.sg

‘She didn’t dance.’

- b. *máátsopokihpiyííwaatsiksi*
 máát-sopok-ihpiyi-waatsiksi
 NEG-finish-dance.VAI-3:nonaff.sg
 ‘She didn’t finish dancing.’

The data in (102) shows a correlating pattern. The activity *okska’si* “run” can be asserted in both its imperfective (102a) or perfective form (102b), and be compatible with an assertion that the activity in question was not completed. This is what we expect if activity predicates in Blackfoot do not encode an inherent endpoint.

(102) **Context:** I went for a run yesterday, but got tired and only did half of my normal route.

- a. *matónni nitáókska’si ki nisto nitsííksistsiko, nimáátsopokokskasspa*
 matónni **nit-á-okska’si** ki n-isto nit-iiksistisko, ni-máát-sopok-okska’si-hpa
 yesterday **1-IMPF-RUN.VAI** conj 1-pro 1-tired.VAI, 1-NEG-finish-run.VAI-LOC:nonaff
 ‘Yesterday I ran, and I got tired, so I didn’t finish my run.’
- b. *matónni nitsííkska’si ki nisto nitsííksistsiko, nimáátsopokokskasspa*
 matónni **nit-ic-okska’si** ki n-isto nit-iiksistisko, ni-máát-sopok-okska’si-hpa
 yesterday **1-ic-run.VAI** conj 1-pro 1-tired.VAI, 1-NEG-finish-run.VAI-LOC:nonaff
 ‘Yesterday I ran, but I got tired, so I didn’t finish my run.’

The activity predicates contrast with the accomplishment predicates like *sinaa annahk niksist* “draw my mother.” The imperfective form of *sinaa annahk niksist* “draw my mother” is asserted in (103a), along with an assertion that the planned event was incomplete. In contrast to the activity *ihpiyi* “dance”, where the negation of the perfective form is infelicitous following an imperfective activity in (101a), (103b) shows that the (non-negated) perfective form is infelicitous following the imperfective claim. (103b) also shows that accomplishments, in contrast to activities like *okska’si* “run,” are such that their affirmative perfective forms are incompatible in contexts where the fact of incompleteness is linguistically salient (unlike the case of activities illustrated in (102b)).

(103) **Context:** I go on an art-kick, and decide I’m going to draw portraits of all of my family members. I draw my dad, my sister, my brother, and start a portrait of my mom, but by then, I’m getting tired, and I never finish her portrait.

- a. *nitáísinaa annahk niksistahk*
 nit-á-sina-a anna-hka n-iksist-wa-hka
 1-IMPF-draw.VTI-LOC:3 DEM-rel 1-mother-3-rel
 ki *nimáátsopoksinaááwaatsiksi*
 ki ni-máát-sopok-sina-a-waatsiksi
 conj 1-NEG-finish-draw.VTI-LOC:3-3:nonaff.sg
 ‘I was drawing my mother, but I didn’t finish.’

- b. # *nítsinaa* *annahk* *niksistahk*
 nit-sina-a anna-hka n-iksist-wa-hka
 1-draw.VTI-LOC:3 DEM-rel 1-mother-3-rel
 ‘I drew my mother.’
BB: No, because you didn’t finish it.

Thus whereas the imperfective/in-progress form of activities appears to entail the truth of their perfective equivalents, the same is not true for accomplishments. We can thus conclude that Blackfoot minimally distinguishes between four aspectual categories: activities, accomplishments, achievements and change-and-states.

An important thing to keep in mind, however, is that while Chin uses many of the same terms that Vendler (1957) proposed for English (activity, achievement), in order to label the Blackfoot aspectual classes, this does not necessarily indicate a 1:1 mapping of semantic behaviour. For instance, achievements in English are easily coerced into an accomplishment-type meaning, where the process leading up to the change is incorporated into the predicate’s lexical meaning (cf. Rothstein (2004)). This allows an achievement like “reach the top” to occur with the progressive (“She’s reaching the top of the mountain”). This kind of coercion is not readily available in Blackfoot. Blackfoot achievements seem to be characterized by their near-instantaneous nature.⁴⁸ On the other hand, while Blackfoot statives (at least, the “change-and-state” statives that Chin (2008) identifies) are easily coerced into an inchoative achievement-like eventive, this is not the case for English statives, which instead are more easily coerced into an activity-like eventive. Thus while the imperfective added to a Blackfoot stative like *isttso’kini* “hungry” gets an inchoative-like “habitually get hungry” interpretation, an English stative in the progressive (“He’s loving his job”) gets a temporary activity-like reading. So while we can conclude that Blackfoot, like English, makes a semantic distinction between different types of aspectual predicates, and even does so along a similar architecture, there are nonetheless differences in how these aspectual classes interact with the rest of the grammar.

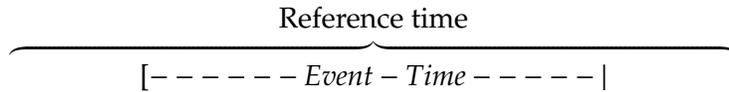
2.2.2 Dunham (2008) and Grammatical Aspect in Blackfoot

The term ‘aspect’ in linguistics is often used to refer to different types of phenomena. In general, ‘aspect’ refers to two different areas of research: lexical aspect (which the previous section was concerned with), and grammatical aspect. Grammatical aspect differs from lexical aspect as a matter of perspective: whereas lexical aspect is concerned with the internal structure of events, grammatical aspect is concerned with how events are externally situated with respect to a reference time. For instance, the traditional description of the distinction between perfective and imperfective aspect

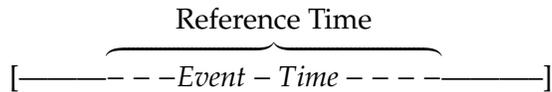
48. For example, consider diagnostic 2 in Table 2.9 above. This shows that the imperfective *á-* cannot coerce an achievement into an in-progress reading, unlike how the English progressive can coerce English achievements into in-progress readings.

is that where the perfective aspect indicates that the event time is contained within the reference time, imperfective aspect indicates that the event time contains the reference time (Klein (1994)).

(104) a. Perfective



b. Imperfective



While Chin (2008) was concerned with lexical aspect, Dunham (2008) focused on the expression of grammatical aspect in Blackfoot. In particular, he investigated the properties of the aspectual morpheme *á-*. He shows that this morpheme regularly yields both in-progress and habitual readings, except with achievements, as shown below in (105).

(105) a. *áókska'si*

á-okska'si-wa

IMPF-run.VAI-3

'He is/was running.' OR 'He runs.'

b. *áístohkohpi*

á-ístohkohpi-wa

IMPF-fall.VAI-3

= 'She falls.' ≠ 'She is falling.'

Dunham thus argues that Blackfoot *á-* is the semantic equivalent of an Indo-European imperfective.⁴⁹ Aiming to account for the above generalisation, he uses Bonomi (1997)'s account for the similarly ambiguous Italian imperfetto as follows.

Bonomi (1997) proposes that imperfectives universally quantify over the "relevant" subintervals of a reference time.⁵⁰ The spirit of the analysis is represented in (106) - *á-* takes a predicate of times (a) or a predicate of events (b) and yields a predicate of times, *t*, such that every subinterval of *t* overlaps with a P-eventuality.⁵¹ The two versions of the imperfective (a) and (b) are required to

49. He also shows that *á-* can attach to statives, the standard diagnostic used to distinguish imperfectives from progressives. The issue of whether the Blackfoot *á-* should be labelled as an imperfective or as a progressive is not crucial for my purposes, however. What is relevant is that *á-* (i) has both in-progress and habitual readings, and (ii) requires a modal semantics to account for the imperfective paradox. The Deo (2009)-inspired denotation proposed in chapter 4 accounts for both of these, whether or not we label *á-* as a progressive, durative or imperfective, etc.

50. He leaves the issue of what makes a subinterval relevant for further research.

51. Dunham's analysis, which is based on Bonomi (1997)'s analysis for the Italian imperfetto, is actually much more complex. The complexity arises, however, from what seems to me to be a purely theory-driven preference for a

account for the observation that the imperfective can attach to either eventive or stative predicates. Under the assumption that eventives are predicates of events, but statives are predicates of times (cf. Katz (1996), Arregui (2007)), an imperfective must be able to apply either to predicates of times (as in (106)a) or to predicates of events (as in (106b)). For our purposes, we can consider just the single denotation in (106b).

- (106) Preliminary Denotation for \hat{a} - (Adapted from Bonomi (1997)/Dunham (2008))
- a. $\llbracket \hat{a}\text{-impf} \rrbracket^{h,c} = \lambda P_{\langle i, \langle s, t \rangle \rangle} . \lambda t . \forall t' \subseteq t \rightarrow \exists t'' [P(t'') \& t'' \circ t']$
 - b. $\llbracket \hat{a}\text{-impf} \rrbracket^{h,c} = \lambda P_{\langle l, \langle s, t \rangle \rangle} . \lambda t . \forall t' \subseteq t \rightarrow \exists e [P(e) \& \tau(e) \circ t']$

Recall that Bonomi (1997)'s main goal is to account for both the in-progress and habitual readings associated with imperfectives. The question is how both readings can arise with a core underlying semantics. The key to yielding both readings with the denotation above is a combination of (i) the universal quantification over t' and (ii) the unspecified length of the λt argument (i.e., the imperfective's reference/evaluation time). If t is short relative to a normal P-eventuality, then all of t 's sub-intervals are likely shorter than a P-event. They can all thus overlap with a single P-eventuality in order to satisfy the truth-conditions. This yields an in-progress reading, where the reference time is contained within the run-time of the single P-eventuality (cf. Klein (1994)). This is schematized in figure 2.3 - the pale blue line at the top represents the RT ("reference time"), t , that the imperfective takes as its argument. The darker aqua lines below that line represent its relevant subintervals, over which the imperfective quantifies. The lavender line at the bottom of the diagram represents the length of a standard P-eventuality (ET, "event time"). In order for the truth-conditions of the imperfective to be validated, each of the aqua subintervals must overlap with a P-eventuality. Because the length of a single P-eventuality is so much longer than these subintervals, a single P-eventuality can overlap with all of these subintervals. Thus an in-progress context satisfies the given truth-conditions.



Figure 2.3: Schema for an In-Progress Reading: Short RT and Long ET

If the reference time is relatively long compared to a normal P-eventuality, on the other hand, then in order for every subinterval of t to overlap with a P-eventuality, many P- eventualities are

parallelism between the imperfective and perfective, and universal and existential quantification; Bonomi (1997) wants the imperfective be a universal quantifier, and the perfective to be its existential equivalent. Because I do not have a compelling reason to believe that the imperfective and perfective (despite the mirroring linguistic terminology) must be formal mirrors of each other, I avoid the more complex semantics Dunham adopts from Bonomi (1997).



Figure 2.4: Schema for Habitual Reading: Long RT and Short ET

required. Such truth-conditions thus require a habitual/generic context. This is schematized in figure 2.4. Again, the pale blue line represents the reference time, t , that the imperfective takes as its argument. The darker aqua lines represent its subintervals, over which the imperfective quantifies. The length of the lavender lines represents the length of a standard P-eventuality. However, because the reference time is long relative to these durations, in order for the truth-conditions of the imperfective to be satisfied, a single P-eventuality cannot overlap with all of the relevant subintervals, thus several P- eventualities are required. This is what obtains in habitual contexts.

I follow Dunham (2008) in treating \acute{a} - as the semantic equivalent of an Indo-European imperfective. Although Ritter (2014)'s analysis of abstract nominalizations suggests that \acute{a} - is syntactically too low to be a viewpoint aspect like imperfective, this only follows in a framework where viewpoint aspect is restricted to occurring in a specific position in a universal syntactic spine. The definition of viewpoint aspect that I use here is purely semantic, however: any temporal operator that encodes a relationship between two times is an aspect. In the same vein, I use a semantic definition for tense: a tense is an aspect that encodes a relationship between two times where one of those times is the utterance time. With this sort of framework, where the \acute{a} - is an aspect based on its semantics as a modifier of λt predicates, and my assumption (as presented in chapter 4) that Blackfoot stems are λt predicates, we expect, as observed in Ritter (2014), that \acute{a} - can merge low (see chapter 8 for more discussion of Blackfoot's syntax-semantics interface). We also expect, given my proposal in chapter 4 that modals like *ohkott-* and *áak-* similarly yield λt predicates, that *ohkott-* and *áak-* marked predicates can be further modified by the \acute{a} -, which is the case.

One thing to note at this point is that the Dunham (2008)/Bonomi (1997) approach to the imperfective is purely temporal; the imperfective is formalized as an operator over temporal predicates. This is because the goal of Dunham's paper was to account for the temporal ambiguity associated with \acute{a} -. Dunham (2008) also shows that Blackfoot \acute{a} - requires a modal analysis, however, as he provides data showing that \acute{a} - marked claims yield imperfective paradoxes. The analysis I put forward in chapter 4 incorporates modality in a similar manner to Deo (2009), which is discussed in chapter 3. I thus return to this issue in chapter 3 and 4, after I have introduced the notion of modality.

2.2.3 Reis Silva & Matthewson (2008) and Tense in Blackfoot

One important claim that Dunham (2008) makes is that Blackfoot obligatorily encodes grammatical aspect, pointing out that in the absence of the imperfective *á-*, Blackfoot eventive predicates are obligatorily interpreted as perfective. This generalisation forms an important component of the analysis of semantic tense in Blackfoot presented by Reis Silva & Matthewson (2008). I turn to this next.

Ritter & Wiltschko (2005) make the observation that Blackfoot lacks regular tense morphology. With this observation arose the question as to whether this morphological property was indicative of deeper grammatical properties of the language, and if so, what type of properties. Ritter & Wiltschko (2005) argue that the absence of overt morphological tense marking in Blackfoot is indicative of a deeper grammatical property: the absence of a syntactic Tense node in the phrase structure. Noting that Blackfoot utterances are ambiguous between past and present readings, Ritter & Wiltschko (2005) suggest that for Blackfoot, the temporal interpretation encoded in English by obligatory tense morphology in T, is rather left unspecified and determined by context.

Reis Silva & Matthewson (2008) argue, however, that the absence of overt morphological tense (whether or not it speaks of a lack of a syntactic Tense node) cannot be indicative of an absence of grammaticized *semantic* tense. They show that the temporal interpretations available to Blackfoot utterances are strictly regulated and systematic. As systematicity is a property of grammar, not context, Reis Silva & Matthewson (2008) conclude that Blackfoot is a (semantically) tensed language. The data underlying their claim is a refinement of Ritter & Wiltschko (2005)'s temporal ambiguity observation. Reis Silva & Matthewson (2008) point out that temporal ambiguity is a property only of a specific subset of predicates: imperfective-marked eventives and statives. Unmarked eventive predicates can only be interpreted as past. This generalisation is shown by the data below; whereas the stative predicate *isttso'kini* "be hungry" is ambiguous between a past and present reading as shown in (107), this is not the case for the eventive predicate *ihpiyi* "dance," which can only be interpreted as past (108), unless overtly marked with the imperfective *á-* (109).

(107) *Anna Mai'stoo isttso'kini*
 ann-wa Mai'stoo-wa isttso'kini-wa
 DEM-3 Raven-3 hungry.VAI-3
 'Mai'stoo is hungry' OR 'Mai'stoo was hungry.'

(108) *Anna Mai'stoo ihpiyi*
 ann-wa Mai'stoo-wa ihpiyi-wa
 DEM-3 Raven-3 dance.VAI-3
 'Mai'stoo danced.'

- (109) *Anna Mai'stoó áłhpiyi*
 ann-wa Mai'stoó-wa á-ihpiyi-wa
 DEM-3 Raven-3 IMPF-dance.VAI-3
 'Mai'stoó is dancing.' OR 'Mai'stoó was dancing.'

The generalisation is summarized in table 2.10.

Unmarked Eventives	<i>á</i> - <i>impf</i> marked Eventives	Unmarked Statives
=PAST	=PAST	=PAST
≠ PRESENT	=PRESENT	=PRESENT

Table 2.10: The Availability of PAST and PRESENT readings

Following Dunham (2008), Reis Silva & Matthewson (2008) assume that grammatical aspect is obligatory, and that the absence of the imperfective morpheme *á*-indicates a null perfective. Given this assumption, they propose that the restrictions on temporal interpretation can be accounted for if Blackfoot is indeed a tensed language, with a (morphologically unexpressed) distinction between past and present, and a formal characterization of Blackfoot's present tense as instantaneous. Following Bennett & Partee (1978)'s analysis of English, with these assumptions, Reis Silva & Matthewson (2008) reason that a present tense interpretation for a bare (perfective) eventive would require a non-instantaneous event to be contained within an instantaneous present time. Because a non-instantaneous event cannot fit inside an instant, such a temporal configuration is blocked; bare eventives in Blackfoot must therefore be interpreted as past. This is even the case for Blackfoot activities like *okska'si* - "run," assuming (as we did above) that activities can hold for very small sub-intervals, but not instants (Dowty (1979)). Blackfoot statives, on the other hand, can satisfy the sub-interval property, and so can be interpreted as true when evaluated with respect to either an instantaneous present time, or to a non-instantaneous past time.

Another work looking at the semantics of temporality in Blackfoot is Reis Silva (2009b), which looks at the preverbal future morphemes *áak*- and *áyaak*-. Following Copley (2002, 2009), Reis Silva (2009b) proposes that *áak*- and *áyaak*- correlate with English *will* and *be going to* respectively. Copley (2002, 2009) will be discussed in more detail in chapter 3. I do not explicitly discuss *áyaak*- in this dissertation, however ; please see Reis Silva (2009b) for more information.⁵²

2.2.4 A Note on Initial Change (IC)

The reader may notice that a (fairly large) subset of *o*-initial Blackfoot verb stems and preverbs undergo an *o* → *ii* ablaut process which I have been segmenting and glossing as 'initial change' or

52. The reason that I do not address *áyaak*- is because I realized too late in the data-gathering process that *áyaak*- (sometimes) behaves differently from *áak*- with respect to the phenomena I discuss. I thus do not have all of the data required to make generalizations about how *áyaak*- behaves with respect to the agentivity of its complement (chapter 4), whether it can license conditional antecedents (chapter 5), the temporal interpretation of its complement (chapter 6) or the presence/absence of actuality entailments (chapter 7.) I leave a thorough investigation of *áyaak*- for future research.

'ic.' For example, the verbal stem for 'bark' sometimes surfaces as *ohkat*, as it is listed in Frantz & Russell (1995) (110a), and at other times surfaces as *iihkat*, as shown in (110b).

- (110) a. *áóhkatsii* *anni*
 á-ohkot-yii-wa ann-yi
 IMPF-bark.VTA-3:3'-3 DEM-3'
 'He barked at him.'
- b. *ííhkatsii* *anni*
 ii-ohkot-yii-wa ann-yi
 ic-bark.VTA-3:3'-3 DEM-3'
 'He barked at him.'

Examples of preverbal elements that undergo this ablaut process are the universal quantifier *ohkan-* (111) and the aspectual morpheme *omaa-* "yet/still" (112).

- (111) a. *áóhkanokska'siyaa*
 á-ohkan-okska'si-yi-aawa
 IMPF-all-run.VAI-3pl-DTP
 'They are all running.'
- b. *ííhkanokska'siyaa*
 ii-ohkan-okska'si-yi-aawa
 ic-all-run.VAI-3pl-DTP
 'They all ran.'

- (112) a. *kitáómaayo'kaa*
 kit-á-omaa-yo'kaa
 2-IMPF-yet-sleep
 'You sleep for a long time.'
BB: It's like every time he sleeps, he just sleeps for a long time.
- b. *kitsíímaayo'kaa*
 kit-ii-omaa-yo'kaa
 2-ic-yet-sleep
 'You're still sleeping.'

What conditions initial change? Is it semantic, morphosyntactic or phonological? All of the cases above are ones where the non-ablaut form is marked with the imperfective *á-*, and the ablaut form is interpreted as past perfective. It is thus possible that initial change encodes either a past or perfective meaning. This is relevant for phenomena discussed in this dissertation because many of the predicates I have been calling 'aspectually unmarked' would actually be overtly marked.

Hypothesis I: Initial Change is associated with semantic content

Imperfective: *á-*
Perfective: ablaut: *o → ii*

The sound-meaning pair $\langle PFV, \text{ablaut} \rangle$ merges in the syntax, where *ablaut* is an autosegmental feature that aligns to the left edge of the prosodic word.

Another possibility, however, is that initial change is phonologically conditioned. Under the assumption that person prefixes are actually person proclitics (cf. Déchaine (1999), Déchaine & Wiltschko (2011), Bliss & Gruber (2011)), the stems and preverbs only undergo initial change when they are aligned with the left-edge of the verbal complex. Under this hypothesis, the observation that the ablaut correlates with a past/perfective meaning is an artifact of the morphological structure of Blackfoot, because Blackfoot's imperfective morpheme always blocks the preverb or verb stem form aligning with the left-edge of the verbal complex. In this section, I will suggest that this second possibility is on the right track, and that the 'aspectually unmarked' verbal complexes I refer to actually are morphologically unmarked for aspect.

Hypothesis II: Initial Change is prosodically conditioned

Imperfective: *á-*
Perfective: \emptyset

Morphophonological rule: $o \rightarrow ii_{PrWd}$

The semantic effect is due to the fact that in imperfective cases, the *á-* attaches in a position so that the phonological context for initial change doesn't arise.

In order to determine whether the conditioning is semantic or phonological, we need to find a mismatch between left-alignment and a perfective interpretation. In other words, we need to find a preverbal morpheme that undergoes initial change, but precedes the imperfective morpheme *á-*. An example of this is the "means/source" morpheme *oht-*. As shown in the example below, this morpheme precedes the imperfective *á-*. More importantly, when it precedes the imperfective, this preverb still undergoes initial change (113b).⁵³

53. Examples of other preverbal elements that block an *o*-initial form from being aligned with the left-edge of the verbal complex are negation *máát-*, *nááno* "finally," *stam-* "just," *ikak-* "even/only" and the modals *áak-* "will" and *aahkama'p-* "might". In these cases, the *o*-initial forms do not undergo initial change, even when the verbal complex is not marked with the imperfective.

- (113) a. *ííhtsooyi* *oma* *ápasstaamiinaam*
 ii-oht-Ioyi-wa om-wa ápasstaamiinaam
 ic-means-eat.VAI DEM apple
 'He ate some of that apple.'
- b. *ííhtáóooyi* *oma* *ápasstaamiinaam*
 ii-oht-á-Ioyi-wa om-wa ápasstaamiinaam
 ic-means-IMPF-eat.VAI DEM apple
 'He is eating some of that apple.'

(113b) is thus an instance of initial change that doesn't correlate with a past perfective interpretation. This suggests that initial change does not encode a past perfective semantics.

In the interest of full disclosure, there are also contexts where the verb stem or preverb is aligned with the left-edge of the verbal complex (minus person proclitics), and initial change does not occur. (114) is an example where the preverbal *ohkan-* is aligned with the left-edge of the verbal complex (minus person proclitics), yet initial change does not occur.

- (114) a. **nitsskanokska'sspinaan*
 nit-ii-ohkan-okska'si-hpinaan
 1-ic-all-run.VAI-1pl
 Target: We all ran
- b. *nítóhkanokska'sspinaan*
 nit-ohkan-okska'si-hpinaan
 1-all-run.VAI-1pl
 'We all ran.'

These cases can all be phonologically identified, however. These are cases where initial change would trigger affrication, which would then trigger post-sibilant. These are both regular phonological rules in Blackfoot: Affrication is a phonological process whereby *ti* sequences become *tsi* sequences and post-sibilant is a phonological process whereby an *ih* sequence, when preceded by an *s*, becomes *s*.

- (115) Regular Phonological Rules (Frantz (1991, 2009))
- a. **Affrication:** $t + i \rightarrow tsi$
- b. **Postsibilant:** $i:h \rightarrow s/s_$

All of the cases where initial change does not occur in the left-aligned context are cases where a *t*-final person proclitic combines with an *oh-* initial stem/preverb, and initial change would trigger the following chain of phonological processes:

(116) Disallowed Sequence

1. **Initial Change:** nit + ohC → nit + iihC
2. **Affrication:** nit + iihC → nits + iihC
3. **Postsibilation:** nits + iihC → nitssC

Thus although there is an exception to the generalisation that initial change occurs in a phonological context - i.e., at the left-edge of the verbal complex (minus person proclitics), the exception is itself phonologically conditioned.⁵⁴ This contrasts with the exception to the generalisation that initial change occurs in a semantically past perfective context, as the “means/source” morpheme *oht-* does not encode any obvious temporal meaning. I conclude from this that initial change is primarily a phonologically-conditioned phenomenon and does not encode a past perfective semantics.

2.3 A Basic Semantic Framework for Blackfoot

From the grammatical sketch and previous empirical investigations, we can start to build a basic architecture for further inquiry into Blackfoot semantics. Although the data that I am concerned with accounting for in this thesis is primarily associated with the verbal domain, I will lay out some of my basic assumptions regarding Blackfoot nominal semantics/the structure of the domain of individuals.

As a typographic note, I will use **boldface** to indicate elements of what I posit as Blackfoot’s semantic ontology (i.e., the semantic categories that the Blackfoot grammar can make reference to and manipulate), *italics* to indicate Blackfoot and English lexical items, and “double quotes” to indicate English translations of Blackfoot items.⁵⁵

54. The question remains as to why this chain of phonological processes should be blocked, as the resulting *tssC* sequence is phonologically well-formed in Blackfoot (e.g., *nitsskskópa’ko* “She left me to watch” (Derrick (2007)). I (very) tentatively suggest that this restriction is likewise phonologically conditioned. Notice that the majority of the cases above are ones where the verbal complex (minus person prefixes) begins with a prominent pitch-accented syllable. This is compatible with an analysis of initial trochees. In phonological contexts like (114), I suggest two options. The first option is that the person proclitic is parsed as part of the prosodic word, PrWd. In this case, the person proclitic blocks the preverb from being in the right phonological context to undergo initial change, and the person proclitic takes pitch-accent to form an initial trochee, as in (114b). The second option is that the person proclitic is not parsed as part of the PrWd (as is usually the case). In this case, initial change occurs, triggering affrication and then postsibilation, which results in the loss of the vowel. According to Derrick (2007), these *ss* sequences in this sort of context are syllabic nuclei. In order to form an initial trochee, however, we would have to place pitch accent on this syllabic *ss*, which being non-vocalic, can’t bear pitch-accent. The first parsing option is thus preferred, which blocks initial change.

55. A list of font conventions is presented at the beginning of the thesis, following the list of glossing conventions. They are repeated here for convenience: SMALLCAPS is used to indicate grammatical category labels (e.g., SUBJUNCTIVE, PERFECTIVE) in text as well as within glosses. SMALL CAPS are also used to represent basic (non-temporally complex) semantic predicates contained within the denotations of lexical predicates - e.g., Blackfoot *ihpiyi* “dance” contains a predicate DANCE which lacks the temporal/event-structure that the lexical item encodes. **Boldface** is used to indicate ontological elements in Blackfoot’s semantic system. *Italics* indicate object-language lexical items. “Double quotes”

Let the ontology contain a domain of individuals, D , which consists of a set of atomic individuals, $\{a, b, c, d, e, f, g, \dots\}$. I assume that noun phrases refer to sets of individuals. Thus *oma imitaa* “that dog”, denotes one of these atomic individuals, e.g. a . As animacy and obviation are not relevant for the data I will be concerned with, I will make the simplifying assumption that the animacy and obviation distinctions are purely morphosyntactic - i.e., they do not have any truth-conditional content, and therefore need not be represented in a semantic framework. While plurality has a clear semantic import, it similarly does not affect the data that I aim to account for in the later parts of the dissertation; I will assume that the domain of individuals is ordered by the part-of relation, \leq , so that the domain forms a join semi-lattice, but leave the particular formalization unspecified. The semantic framework presented is compatible with a Link (1983) sum-style approach to plurality, wherein a plural noun phrase like *omiksi imitaiksi* “those dogs” denotes a sum of individuals, e.g., $a \oplus b \oplus c$, where the symbol \oplus represents sum formation, and the asterisk represents closure under sum formation.

- (117) a. D is the domain of individuals
 $=\{a, b, c, d, e, f, g, \dots\}$
 b. $*D$ is the domain of individuals closed under sum formation
 $=\{a, b, c, d, e, f, g, \dots, a \oplus b, a \oplus c, a \oplus d, \dots, a \oplus b \oplus c, b \oplus c \oplus d, d \oplus e \oplus f, \dots\}$

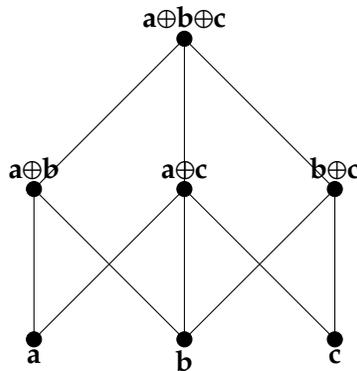


Figure 2.5: Lattice Structure of $*D$

The framework can also easily be reframed with a Schwarzschild (1996)-style approach, wherein singular noun phrases like *oma imitaa* “that dog” denote singleton sets of atomic individuals and plural noun phrases like *omiksi imitaiksi* “those dogs” denote non-singleton sets of atomic individuals (as represented in (118)). The Schwarzschild (1996) sets-style approach would require defining any function that takes an individual argument as instead taking a set containing individuals. For example, functions of type $\langle e, t \rangle$ would not refer to functions from individuals to

mark translations of Blackfoot lexical items/phrases/sentences. “Double quotes” are also used to demarcate in-text English examples that are full sentences (as opposed to single lexical items or phrases which are marked with *italics*). **BOLDFACE SMALLCAPS** are used to introduce relevant new terminology.

truth-values, but functions from sets of individuals to truth-values. In what follows I adopt the sums-style approach. Note, however, that this choice is based purely on my desire to avoid the more-complicated prose required of the sets-style approach.⁵⁶

(118) Formulated in a Schwarzschild (1996)-style Approach

- a. D is the domain of individuals
 $=\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}, \mathbf{g}, \dots\}$
- b. *D is D closed over sum formation
 $=\{\{\mathbf{a}\}, \{\mathbf{b}\}, \{\mathbf{c}\}, \{\mathbf{d}\}, \{\mathbf{e}\}, \{\mathbf{f}\}, \{\mathbf{g}\}, \dots, \{\mathbf{a}, \mathbf{b}\}, \{\mathbf{a}, \mathbf{c}\}, \{\mathbf{a}, \mathbf{d}\}, \dots, \{\mathbf{a}, \mathbf{b}, \mathbf{c}\}, \{\mathbf{b}, \mathbf{c}, \mathbf{d}\}, \{\mathbf{d}, \mathbf{e}, \mathbf{f}\}, \dots\}$

Recall that Blackfoot nouns, both common and proper, require determiners in order to satisfy the transitivity requirements of a verbal predicate. I suggest (as is standard semantics for nominals) that Blackfoot common nouns are predicative elements of type $\langle e, t \rangle$ - i.e., functions from individuals to truth-values. Nominal stems unmarked with plural morphology thus denote the characteristic functions of sets containing atomic individuals. For instance, the nominal stem *imitaa* “dog” will denote a function from the domain of atomic individuals, to truth-values (yielding true if the atomic individual is in the set of atomic dogs, false otherwise). Nominal stems marked with plural morphology denote characteristic functions of sets containing both atomic and plural individuals. Plural nominals like *imitaiksi* “dogs,” then, denote a function from the domain of individuals (atomic and non-atomic) to truth-values (yielding true if the plural individual is a member of the set of dogs, false otherwise.) The determiners *oma*, *omi*, *omiksi*, *omistsi*, etc. are similar to choice functions. These are functions that take a function of type $\langle e, t \rangle$, and yield an indexed variable that ranges over members of that function’s characteristic set.⁵⁷ Complete noun phrases like *oma imitaa* “that dog” and *omiksi imitaiksi* “those dogs” can thus satisfy the transitivity of verbal predicates which want an argument with the type of an individual.⁵⁸ The assignment function, *h*, interprets the indices on these variables and maps them to contextually-salient individuals. (119) gives examples of lexical entries for nominal stems and determiners.

56. Although plurality is orthogonal to the phenomena I discuss, I have introduced Schwarzschild (1996)’s set-theoretic approach in order to set the stage for my discussion of temporality: In what follows, I will take a Schwarzschild (1996)-inspired set-theoretic approach to model the domain of times. That is, I will treat the distinction between instants and intervals as a difference between singleton and non-singleton sets of times respectively.

57. Recall, however, that there are some determiners/demonstratives in Blackfoot like *annihkayi* “that certain (animate)”, *anniskayi* “that certain (inanimate)”, along with the numerals *ni’tokska* “one,” *nátoka* “two,” *niyookska* “three”, etc. - which differ from the determiners/demonstratives mentioned above in that they allow the nominal expression they modify to act either as an argument, or a non-argument (i.e., can appear with morphologically intransitive verbs). I leave a proper semantics for these determiners/demonstratives as an unresolved mystery for future research.

58. Bare plurals, which can also satisfy a verbal predicate’s transitivity if interpreted generically, I will assume, combine with a null determiner which is essentially a maximality operator, taking the plural nominal’s denotation and returning the ‘kind’ - i.e., the plural individual highest ranked by \leq .

- (119) a. $\llbracket imitaa \rrbracket^{h,c} = \lambda x_e . x \in \text{DOG}$
 (where DOG is the set of atomic dogs in D)
- b. $\llbracket oma_i \rrbracket^{h,c} = \lambda P_{\langle e,t \rangle} : h(i) \in P . h(i)$
- c. $\llbracket oma_i imitaa \rrbracket^{h,c} = h(i)$ (defined iff $h(i)$ is a member of DOG)
- d. $\llbracket omiksi_i \rrbracket^{h,c} = \lambda P_{\langle e,t \rangle} : h(i) \in *P . h(i)$
- e. $\llbracket imitaiksi \rrbracket^{h,c} = \lambda x . x \in * \text{DOG}$
- f. $\llbracket omiksi_i imitaiksi \rrbracket^{h,c} = h(i)$ (defined iff $h(i)$ is a member of $* \text{DOG}$)

Because names also require determiners in order to satisfy the transitivity of a verbal predicate, I will suggest that names denote sets of individuals (i.e., individuals with that name), and that the determiners *anna*, *anniskayi* etc., apply to these denotations, yielding an individual.⁵⁹ Lastly, as the status of nominal quantifiers is still a question of determining the right empirical generalisations, I leave a formalization for those elements for further research.

Having set up a basic outline for the semantics of the nominal domain, I now move on to the verbal domain. The components we can use as building blocks are the following previous claims: Chin (2008) provided evidence that basic aspectual classes are grammaticized, Dunham (2008) argued that grammatical aspect is semantically obligatory, Reis Silva & Matthewson (2008) similarly argued that tense is obligatory, and a key distinction that Reis Silva & Matthewson (2008) relied on is the theoretical distinction between instants and intervals.⁶⁰ Given these, in addition to a domain of individuals, **D**, and a domain of truth-values, I will assume the existence of a domain of events, **E**, and a domain of times, **I**. I assume that **E** is formally analogous to the domain of individuals - i.e., that **E** consists of a set of atomic events $\{e_1, e_2, e_4, e_5, \dots\}$. Like individuals, events can be plural, which I will represent as sums of events, and the domain of events is ordered by the “part-of” relation \leq , such that the domain forms a join semi-lattice. I will assume that the domain of times, **I** = $\{t_1, t_2, t_3, t_4, t_5, \dots\}$, consists of instants which have no extent in time, and are ordered by the temporal precedence relation, $<$, on a scale, as schematized in (120).⁶¹

- (120) The Time Scale
 $\dots t_1 < t_2 < t_3 < t_4 < t_5 \dots$

59. With the exception of *Naapi*, the trickster, and other mythological entities like *Nato’si*, the sun, which differ from other names in that they do not require determiners/demonstratives.

60. Whether or not the Blackfoot tense morphemes are situated in the same sort of functional projection as tense/Infl in English is a claim that I take no position on. Ritter & Wiltschko (2004, 2005) argue that person inflection in Blackfoot shows morphosyntactic parallels to tense inflection (and hence Infl) in English. They take this as evidence that Infl in Blackfoot is not instantiated by a Tense node, but a Person node. They do not make any claims about the morphosyntactic status of the obligatory semantic tense effects.

61. The subscripts on the times in schema (120) are represented as whole numbers as a matter of readability and convenience. This is not meant to represent an ontological view where times are countably infinite. The schema below, which includes irrational numbers like π , e and $\sqrt{2}$ is equally compatible with the ontological system I adopt.

- (i) The Time Scale
 $\dots t_1 < t_{\sqrt{2} (1.414\dots)} < t_2 < t_e (2.71828\dots) < t_3 < t_\pi (3.14159\dots) < t_4 < t_5 \dots$

Given two instants, t_1 and t_{19} , $t_1 < t_{19}$ holds just in case t_1 temporally precedes t_{19} . Intervals are a subset of the time scale. In other words, they are a set of instants that are temporally ordered and contiguous. This means that for any t_x and t_z in the interval, if there exists a t_y such that $t_x < t_y < t_z$, then t_y is also a member of the interval. This is illustrated below in (121).

- (121) a. $\{t_2, t_3, t_4\}$ An interval
 b. $\{t_2, t_{19}, t_4\}$ Not an interval
 c. $\{t_1, t_2, t_3, t_5, t_6, t_7\}$ Not an interval

Both instants and intervals are of type i , and thus lexical items which map onto either instants or intervals can (other factors notwithstanding) satisfy functions which require a time argument. I will follow Reis Silva & Matthewson (2008) (who follow Bennett & Partee (1978)), and assume that the present (t_0) and past tense (t_{iPAST}) are temporal variables corresponding to an instant and an interval respectively. This distinction between an interval and instant will become relevant to account for the next set of data we will consider.

One thing which should be noted at this point is that technically, an instant fits the definition of an interval - i.e., $\{t\}$ is technically a subset on the time-scale. Thus the distinction between instants and intervals (i.e., the issue of whether elements of the language map onto instants or intervals) could instead be formalized as a distinction of whether natural-language expressions map onto trivial or non-trivial intervals. This is in fact what I will formally assume for what follows - i.e., that present tense $\emptyset_{PRESENT}$ corresponds to an indexed variable that ranges over trivial intervals. By default, this variable is interpreted as the time of utterance associated with the speech context, t_0 . Past-tense \emptyset_{PAST} , on the other hand, corresponds to an indexed variable that ranges over non-trivial intervals preceding t_0 . I will represent this variable with t_{iPAST} . This has the analytical advantage whereby lexical items that take temporal arguments can be formalized as uniformly selecting for intervals, instead of selecting for either intervals or instants. I will, however, continue to informally talk about trivial intervals as “instants.”

(122) Blackfoot Tenses

- a. $\llbracket \emptyset_{PRESENT} \rrbracket^{h,c} = t_i = c(i)$,
 (Where $c(i)$, unless otherwise specified, is t_0) type i , an instant (trivial interval)
 b. $\llbracket \emptyset_{PAST} \rrbracket^{h,c} = t_{iPAST} = c(i)$, provided $c(i) < t_0$ type i , an interval

As mentioned above, I follow Reis Silva & Matthewson (2008) in proposing the existence of the two tenses $\emptyset_{PRESENT}$ and \emptyset_{PAST} , which map onto the temporal variables t_0 and t_{iPAST} . I further assume that t_0 and t_{iPAST} are the *only* tenses provided by Blackfoot’s semantic system, where tenses directly refer to variables over times. The semantic manipulation of time variables besides t_0 and t_{iPAST} involves existential or universal quantification over times, as opposed to direct reference - i.e., the

semantic manipulation of time variables besides t_0 and t_{IPAST} involve aspect. This means that the system I propose for Blackfoot does not make available a future tense which directly refers to a time variable following t_0 . Reference to the future involves an interaction between **PROSPECTIVE ASPECT** and action-dependent modals. This interaction will be discussed further in chapter 4 and 6.

With these additions to the ontology, verb stems can be formalized as requiring temporal or event arguments. I will follow Arregui (2005, 2007) and Katz (1996) in formalizing the distinction between eventives (accomplishments, activities and achievements) and statives along those lines: I will treat statives as containing a time, individual, and world argument (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$), while eventive predicates have an additional event argument (type $\langle l, \langle i, \langle e, \langle s, t \rangle \rangle \rangle \rangle$). The AG relation relates an individual (the agent), to the event. At this point, AG is a placeholder for the semantics for agency that I present in chapter 4.⁶²

- (123) a. STATIVES:
 $\llbracket \text{isttso}'\text{kini} \rrbracket^{\text{h,c}} = \lambda t. \lambda x. \lambda w. [\text{HUNGRY}(x)(w)(t)]$
- b. EVENTIVES:
 $\llbracket \text{okska}'\text{si} \rrbracket^{\text{h,c}} = \lambda e. \lambda t. \lambda x. \lambda w. [\text{RUN}(e) \& \tau(e) = t \& \text{AG}(x)(e)(w)]$

The reader may recall that the class of states that Chin (2008) identifies are labelled as ‘change-and-state’ predicates. We might then wonder whether these are actually eventive predicates (i.e., achievements), and whether a difference between eventives and statives is necessary. Recall, however, that change-and-state predicates like *isttso'kini* “be hungry” behave differently from achievements like *istohkohpi* “fall” in how they interact with the imperfective *á-*: while an imperfective-marked achievement like *istohkohpi* can only have a habitual/generic interpretation, an imperfective-marked stative like *isttso'kini* can have (in addition to the habitual/generic) reading, a past or present “state holds” interpretation. The availability of this “state holds” interpretation for predicates like *isttso'kini* indicates that they form a distinct aspectual class from achievements, as achievements lack this “state holds” reading. Chin (2008) suggests that the ambiguity (having both change and state readings) associated with predicates like *isttso'kini* “hungry” can be captured by a systematic lexical ambiguity - i.e., all change-and-state predicates are ambiguous between an eventive achievement reading and a non-eventive state reading. Adopting this suggestion, the non-eventive stative readings of predicates like *isttso'kini* “hungry” can be formalized, Arregui (2005, 2007) and Katz (1996)-style, as lacking an event argument. The precise terms I will adopt for the types associated with lexical eventives (type $\langle l, \langle i, \langle e, \langle s, t \rangle \rangle \rangle \rangle$) and lexical statives (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$) are **PREDICATES** and **TEMPORALLY-INDETERMINATE PROPERTIES** respectively, as

62. The reader may wonder why eventive predicates require a time argument that correlates with the runtime function having applied to the event argument. I have introduced the time argument, as opposed to merely using the equivalent $\tau(e)$ in the relevant places in the formula, because we will want to still be able to refer to the runtime of the event at points in the composition after the event variable is bound by existential closure. In the system I have set up, the event variable is closed off very soon in the composition; this also allows aspects and modals to uniformly apply to either statives or eventives.

factive *á-*, null perfective, and perfect *ikaa-* as functions from temporally-indeterminate properties (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$) to temporally-indeterminate properties (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$) - i.e. modifiers of temporally-indeterminate properties. This approach allows Blackfoot's aspectual operators to have a freer distribution than would be predicted under the Kratzer (1998)-style approach. If these elements mapped from **PREDICATES** to **TEMPORALLY-INDETERMINATE PROPERTIES**, we would expect (i) only one (e.g., perfective, imperfective, or perfect) to occur per verbal complex, and (ii) that these aspectual markers would have a fixed location in the verbal complex, only applying to eventive verb stems. This, however, is not the case. The aspectual operators can apply to verb stems that have already been modified by other aspectual markers and, as we will see in chapter 4, verb stems that have already been modified by modals.⁶³ Blackfoot's morphosemantic encoding of "grammatical" aspect thus does not behave like a functional head in a UG-determined functional spine.

The particular formalization of grammatical aspect taken here is not quite in the spirit of Dunham (2008): nothing in the system prevents an eventive predicate from combining directly with a null past tense, so that the contextually-salient past time interval that past tense denotes is taken to correlate with the runtime of the event. I will assume, however, the availability of a null perfective operator, so that a morphologically unmarked predicate may be interpreted such that the runtime of the event is contained within the contextually-salient past time interval.⁶⁴ Recall from chapter 1 that Ritter & Wiltschko (2009) and Ritter (2014) propose that English and Blackfoot differ in terms of what they semantically encode in their functional spine: while English encodes temporal notions like tense and aspect, Blackfoot encodes participant-related notions like person and animacy (see chapter 8 for more discussion). The approach to viewpoint aspect I take here, wherein the imperfective/perfective/perfect are treated as modifiers (as opposed to syntactically-restricted functional heads) is compatible with the spirit of their analysis. For now, I adopt the following (provisional) denotations for Blackfoot's imperfective, perfective and perfect respectively.

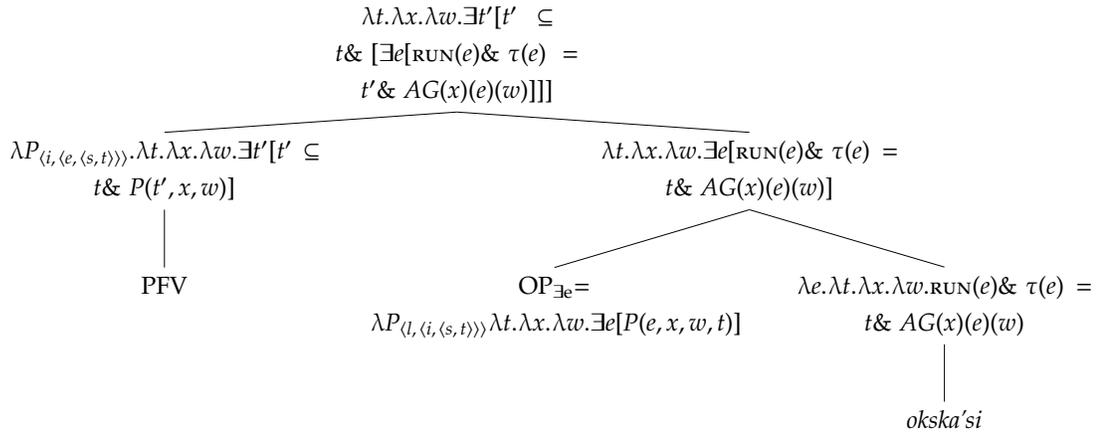
63. For instance, the imperfective can apply to verbal stems modified by the aspectual morpheme *sa:ki-* "still," which itself takes an imperfective-modified complement.

64. The availability of a null perfective aspect would be required under the assumption that temporal modifiers like *matónni* "yesterday" and *apinákosi* "tomorrow" denote time intervals that provide reference times. Verbal complexes modified by these temporal modifiers are interpreted such that the runtime of the event is contained within *matónni/apinákosi*. They do not get a reading where the runtime of the event correlates with *matónni/apinákosi*. This suggests that a perfective aspect must modify the verbal complex before temporal modifiers like *matónni/apinákosi* merge. Another possibility, however, is that *matónni* "yesterday" and *apinákosi* "tomorrow," do not provide overt reference intervals, but merely restrict the temporal location of a covert reference interval. This would allow the absence of morphological aspect to correlate with a true lack of grammatical aspect while still accounting for the data generalizations; the inherently dynamic properties of an eventive, even without being modified by perfective aspect, will be incompatible with an instantaneous present tense. Because more research on the semantics of temporal modifiers like *matónni/apinákosi* is required, I do not take a stand on the issue, as both approaches are compatible with the phenomenon I aim to account for.

- (125) a. $\llbracket \acute{a}\text{-IMPF} \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists t' [t \subset t' \& \forall k \in \mathcal{R}_c^k \rightarrow \exists t'' [P(t'')(x)(w) \& t'' \circ k]]$
 b. $\llbracket \emptyset_{\text{PFV}} \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists t' [t' \subseteq t \& P(t', x, w)]$
 c. $\llbracket ikaa\text{-PERF} \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists t' [t' < t \& P(t', x, w)]$

These operators combine with a temporally-indeterminate property in the semantic composition, and yield another temporally-indeterminate property, as shown in (126): this composition shows the verb stem *okska'si* “run,” whose event argument has been satisfied by an existential event operator, further being modified by perfective aspect.

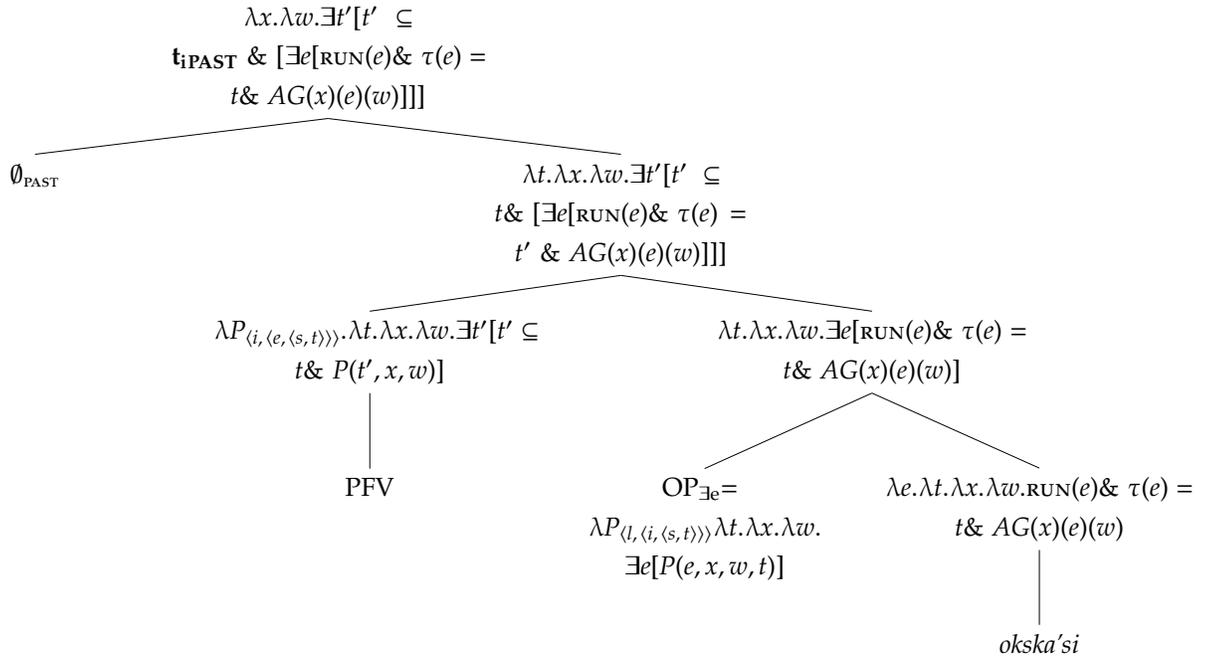
(126) Modifying with Viewpoint Aspect



The denotation of the perfective is based off of Kratzer (1998), the imperfective is a variant of Dunham (2008)’s Bonomi-inspired analysis, modified to incorporate insights from Deo (2009). In the denotation in (125a), the imperfective introduces a superinterval of the evaluation time, t' , and then regularly partitions it into equal intervals of a contextually-determined length. \mathcal{R} is what yields these intervals; it uses the context parameter, c , to determine what the lengths of the k -partitions should be. The imperfective then asserts that each of these k -intervals overlaps with a P -eventuality (as represented with the overlap relation \circ). The motivation for the Deo (2009)-inspired modifications will be discussed in chapter 3, where I will also discuss how the Blackfoot imperfective (like other imperfectives crosslinguistically) requires a modal semantics (cf. Dowty (1979), Portner (1998), Deo (2009)). Notice that where the perfective yields a predicate of (non-trivial) intervals - i.e., a temporally-indeterminate property that is not defined for instants, this is not the case for the imperfective. The imperfective yields a predicate of instants - i.e., a temporally-indeterminate property that can be true of an instant. In this sense the imperfective is a stativizing element. This sort of lexical entry accounts for why imperfective-marked predicates, like statives, are compatible with present tense readings; imperfective-marked predicates can take the instantaneous interval denoted by the present as their evaluation time. A perfective-marked predicate, on the other hand, can only take the non-instantaneous intervals that the past tense denotes as its evaluation time. The combination of an aspectually-modified predicate with an

evaluation time (provided by tense) is shown in the tree below. This yields a **PROPERTY**, as listed previously in Table 2.11.

(127) Satisfying the Temporal Argument with Tense



The final step required to turn the semantic composition into a **PROPOSITION** (i.e., a function from worlds to truth-values) is the addition of an individual argument. Delaying the entrance of the agent/external argument to this point is by design; one of the main intuitions driving the semantics I will propose is the idea that circumstantial modals need access to the verb stem's λx argument. This is because the meaning of circumstantial modals refers to the agent/external argument's circumstances and the actions open to her. If the external argument merged prior to the addition of temporal/aspectual/modal preverbs, the proposed sort of semantics would not be possible.

What I have described so far can account for the basic truth-conditions of the simplest utterances in Blackfoot - i.e., unmodified verb stems that have only been operated upon by tense and aspect. The majority of the data that I am interested in accounting for, however, deals with how tense and aspect interact with modal and conditional constructions. In the next chapter (chapter 3), I review some of the general theoretical literature that relates to the phenomena of interest, and discuss how Blackfoot behaves with respect to these phenomena. This will allow us to expand the framework just described to accommodate the phenomena of interest. In particular, I will review the standard Kratzer-approach to modality and conditionals (which abstracts away from temporality), and then discuss how modality and temporality interact, along the lines discussed by Condoravdi (2002) and Ippolito (2003).

Chapter 3

Modals, Conditionals and Time

“Let’s say a continent blew up. Or it didn’t blow up. The two things couldn’t both be true at once in the same world, so that world became two worlds, side by side but quite separate, one with that continent and one without. And so on...”

Excerpt from *The Lives of Christopher Chant*, by Diana Wynne Jones

In this chapter I introduce Kratzer’s standard framework for conditionals/modality, and then review selected works which address the interaction of temporality and modality. In particular, I look at Ippolito (2003), Condoravdi (2002), Copley (2002, 2009) and Matthewson (2012). I then look at various approaches to ability modals (Kratzer (1981, 2012), Hackl (1998), Brown (1988), Xie (2012)), and then discuss modal approaches to the imperfective (Portner (1998), Deo (2009)).

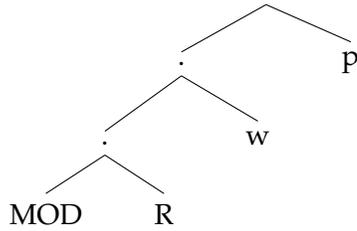
3.1 The Kratzerian Framework for Modality

3.1.1 The Modal Base and Ordering Source

The most widely-used approach to conditionals and modality within the generative linguistic tradition is that of Angelika Kratzer (Kratzer, 1977, 1981, 1989, 2012). Kratzer’s approach to modality fits within the traditional modal logic approaches that treat modals as quantifiers over possible worlds. In these accounts, the meaning of a modal can be divided up into two parts: its quantificational force (either existential, or universal), and its domain of quantification (which is determined by an accessibility relation, R). The modal takes a proposition, p , as its complement, and asserts that all or some of the worlds accessible from the evaluation world via R , are worlds where p holds true. A note on terminology: throughout the dissertation, I will often use the term ‘prejacent’ to refer to the complement of a modal.⁶⁵

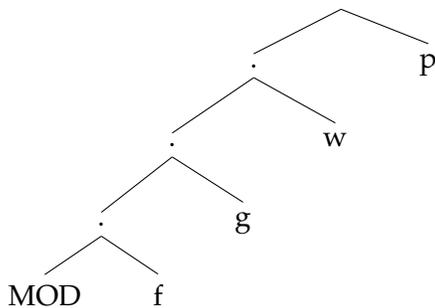
65. The term ‘prejacent’ comes from logical traditions, where ‘prejacent’ refers to propositional complements. As the traditional analyses of modals treat the complement of a modal as a proposition, the term ‘prejacent’ is apt. The analysis that I present in this dissertation, however, is one where modals take temporally-indeterminate properties as their complement, as opposed to taking propositions (which have had their individual and temporal arguments satisfied, and are functions from worlds to truth-values). Nonetheless, I will still use the term ‘prejacent’ to refer to the complement of modals, as is common in the literature.

- (128) Traditional Approach: A single Accessibility Relation, R
 $\text{MOD}(R)(w)(p) = 1 \text{ iff } \forall w' \in R(w, w')[p(w')]$



Strongly influenced by Lewis' ordering semantics, Kratzer divides the role originally played by the accessibility relation between two contextually provided functions: **THE MODAL BASE** and **THE ORDERING SOURCE**. The modal base and ordering source are both types of **CONVERSATIONAL BACKGROUNDS**. The modal base, like traditional modal logic's accessibility relation, is a function that yields a set of possible worlds compatible with some aspect of the evaluation world. The ordering source is used in conjunction with an additional function, MAX. Together these elements take the set of possible worlds, order them (via the *ordering* source), and then yield as an output, a subset consisting of the highest-ranked worlds (via MAX). This resulting set of possible worlds is the modal's domain of quantification.

- (129) Kratzer's Approach: A Modal Base, f, and Ordering Source, g, and MAX
 $\text{MOD}(f)(g)(w)(p) = 1 \text{ iff } \forall w' \in \text{MAX}_{g(w)}(\cap f(w))[p(w')]$



In what follows I will describe Kratzer's framework in more detail, first discussing the modal base, and then the ordering source.

One of the main observations that Kratzer (1989) aims to account for is what appears to be a systematic ambiguity seen in modals. This apparent ambiguity can be illustrated for English as follows.⁶⁶ Consider the sentence *You must be older than nineteen*. If this can be both true and false in a single context, then it can be said to be ambiguous, in that it has two distinct senses. Next consider the context given in (130).

66. I qualify the term 'ambiguity' as 'apparent ambiguity' because in Kratzer's analysis, this is not true ambiguity in the sense that a single lexical item has two distinct meanings, or that there is a structural ambiguity. Rather, a crucial part of the modal's meaning - the kind of conversational background - is underspecified. The context in which the modal claim is uttered provides the relevant conversational background and fully specifies the meaning of the modal claim. Different conversational backgrounds will result in interpretations of the modal claim with distinct meanings/truth-conditions.

- (130) **Context:** The legal age for alcohol consumption in British Columbia is nineteen. A couple comes into a restaurant, and ask if they can sit at the bar, since no tables are available. The hostess recognizes them, however, as classmates of her younger brother, who is only sixteen. She informs them: "You must be older than nineteen."
- a. (In view of the law,)
you **must** be older than nineteen. TRUE
- b. (In view of what I know,)
you **must** be older than nineteen. FALSE

In the sense conveyed by (130a), the utterance is true, but in the sense conveyed by (130b), the utterance is false. In the traditional approach, this ambiguity follows from the modal *must* taking distinct modal bases; (130a) is a case where it takes a deontic modal base, and (130b) is a case where it takes an epistemic modal base.⁶⁷ The flavour of modal base (i.e., whether it is deontic or epistemic) refers to which aspects of the evaluation world the modal takes into account. These aspects of the evaluation world (*w*) are formalized as sets of propositions: where a deontic modal base makes reference to a set of laws in *w*, an epistemic modal base makes reference to the set of facts that the speaker in *w* knows, or has available to them as evidence. The modal base can then pick out those worlds that are compatible with the relevant set of propositions. Adopting a possible-world semantics, Kratzer formalizes propositions as sets of possible worlds - the set in which that proposition is true. The intersection of the propositions that the modal base makes reference to thus corresponds to the set of possible worlds in which all the propositions considered are true. This set of worlds is the output of the modal base. Thus a deontic modal base makes reference to a set of laws and selects the set of worlds whose facts are consistent with those laws. An epistemic modal base makes reference to a set of facts that are known, or taken to be evidence, and then selects the set of possible worlds that are consistent with those facts.

As of yet, Kratzer's approach does not seem so different from the traditional modal logic approach which uses an accessibility relation to select a subset of the set of possible worlds. One way that Kratzer's approach differs from the traditional approach, however, is that she introduces the notion of an ordering source (inspired by Lewis (1981)). The ordering source can be used to solve several problems that arise within a traditional modal logic approach. (131) is a variation of the problem posed by 'The Samaritan Paradox'.

- (131) **Context:** Three men who have just robbed a train realize that their illegal act has been witnessed. So they shoot the witness to ensure his silence, and then drive off. A couple of minutes later, you are passing by the railroad tracks and find the man who has been shot. He is still alive, but is bleeding out.

67. Kratzer differs from these traditional approaches. As we will see, she proposes that epistemic modals take an epistemic modal base with a stereotypical ordering source, while deontic modals take a circumstantial modal base with a deontic ordering source. As I have not yet discussed ordering sources, I abstract away from this complication at this point in the exposition.

You must help him.

Now assume that the following are laws in the world of evaluation:

- (132)
1. Train robbery is illegal
 2. Attempted murder is illegal
 3. Standing by and letting someone die (where there is no danger to yourself) is illegal

If we consider a traditional approach, the sentence in (131) is true iff in all worlds compatible with the laws (i.e., the worlds made accessible by a deontic accessibility relation), you help the injured man. But given the context in (131), the sentence *You must help him* is incorrectly predicted to be false, because in all of the worlds compatible with the laws, the train was never robbed, the witness was never shot at all, and the witness would therefore have no need of your help. Thus in all of the worlds compatible with the laws, you do *not* help the man. This is, obviously, incompatible with our judgements regarding the truth-value of (131). The traditional approach to deontic modals only works so long as the facts of the evaluation world are compatible with the laws of the evaluation world, a state of affairs that is rarely the case.

Dividing up the accessibility relation into a modal base and ordering source can solve this problem. Kratzer analyses a deontic modal like (131) as having a circumstantial modal base (i.e., consisting of all of the relevant facts that are true in the evaluation world)⁶⁸, e.g., consisting of the propositions in (133).

- (133)
1. Three men robbed a train
 2. A man witnessed the robbery
 3. The culprits shot the witness and drove away
 4. You happened upon the dying witness

Only worlds that are compatible with these facts are made accessible by the modal base, which means that the worlds where the train was never robbed, and the witness was never shot - the worlds that caused trouble for the traditional approach - are effectively ignored. The laws listed in (132) are used by the ordering source to further reduce the remaining set of worlds. It does so by ordering the worlds according to how consistent the worlds are with respect to the relevant laws. Thus the worlds (that are compatible with the facts) which are consistent with more of the laws in (132) are ranked high, and the worlds (that are compatible with the facts) which are consistent with few of the laws in (132) are ranked low. Once the set of worlds made accessible by the modal base are ranked as such, the subset consisting of the highest ranked worlds is taken as the modal's

68. Kratzer (1981) actually proposes a totally realistic modal base, which consists of all of the facts that are true in the evaluation world - i.e., what Copley (2002, 2009) and Condoravdi (2002) refer to as a metaphysical modal base.

domain of quantification. This means that the assertion made by the *must* statement in (131) is that this subset of worlds (the highest ranked worlds which are consistent with the train being robbed, the witness being shot, you happening upon the dying witness) are worlds where you help the man. Under this approach, we predict the sentence in (132) to be true. This is consistent with our intuitions.

Note that the introduction of the ordering source is also useful in other flavours of modality (e.g. for epistemic modals). Consider, for example, the relative difference in strength between (134a) and (134b).

- (134) **Context:** Homicide has called in the Drug Enforcement Agency on their new murder victim, because they have found evidence linking the murder victim, Gail Boetticher, to the DEA's case on blue methamphetamine. Boetticher's death is consistent with drug-related killings, and they find notebooks of Boetticher's which detail the formula of the blue methamphetamine, as well as details regarding the type of lab required to produce the blue meth.
- a. Gail Boetticher must be Heisenberg, the man behind the blue meth.
 - b. Gail Boetticher is Heisenberg, the man behind the blue meth.

Intuitions state that the modally-modified (a) is weaker than the non-modal (b) (but see von Fintel & Gillies (2010)). This is unexpected under a traditional approach, which states that (a) is true if all of the worlds which are compatible with what the speaker knows to be true are worlds in which Gail Boetticher is Heisenberg. Because the actual world is a world which is compatible with what the speaker knows to be true, (a), under this analysis, should asymmetrically entail (b), and thus be a stronger claim, contrary to our intuitions.

The Kratzer-approach, by contrast, doesn't have this problem. According to this approach, (134a) has an epistemic modal base, and a stereotypical ordering source. This means that we start off with all of the worlds which are compatible with what the speaker knows to be true (which includes the actual world). We then order these worlds according to how consistent they are with how we believe the world stereotypically works, and claim that all of these worlds - the worlds which (i) are compatible with what we know, and (ii) follow the normal course of events, are worlds in which Gail Boetticher is Heisenberg. Although the actual world was included in the initial set of worlds made accessible by the modal base, there is no guarantee that the actual world is among the most likely worlds. This accounts for why (134a) seems like a weaker claim (regarding how the actual world is) than the non-modal assertion in (134b).

3.1.2 "If"-Clauses as Restrictors

Kratzer's approach to conditionals is an extension of the proposal made by Lewis (1975), whereby *if*-clauses are viewed as restrictors for adverbs of quantification. Kratzer suggests that *if*-clauses can act as restrictors for modals (overt and covert).

Prior to Lewis (1975), the dominant view on *if*-clauses was that *if* introduced a two-place connective like the material implication connective \rightarrow in first-order logic. Lewis (1975), looking at the interaction between *if*-clauses and quantificational adverbials like *never*, *rarely*, *sometimes* and *always* (135), proposed that the *if*-clause in such cases is not associated with a two-place connective. Rather, the *if*-clause only acts to restrict the quantificational adverbial, parallel to the way that a bare noun phrase like *dog* restricts a nominal quantifier like *every* in *every dog*.

- (135) a. If a cat falls, it **always** lands on its feet.
b. If you toss a penny, it **rarely** lands on its edge.
c. If my cousin eats a sandwich, he **never** eats the crust.

If you consider a sentence like "every dog barks," the role that *dog* plays is to restrict the universal quantification introduced by *every* so that not every entity in the world is asserted to bark. Rather, every entity *within the set of dogs* is asserted to bark. This allows non-dogs, like cats, seals and trees to not bark. The *if*-clauses in (135) can be viewed as performing a parallel domain-restricting function to *dog*. Consider (135c), where the quantificational adverb *never* introduces universal quantification over situations. The function of the *if*-clause "If my cousin eats a sandwich" restricts this quantification so that we are not asserting that every situation is a situation where my cousin doesn't eat the crust. Rather, only situations where my cousin is eating a sandwich are situations where he doesn't eat crust. This allows for situations where my cousin does eat crust, say in situations where he is eating french toast.

Kratzer (1977) took this insight and extended it, proposing that *if*-clauses in general act as domain restrictors. In other words, there is no natural language "if...then" connective akin to \rightarrow . The *if*-clauses we see are always restricting some other operator in the clause, whether it is a quantificational adverbial as in the examples in (135), an overt modal as in (136a,b), or a covert modal as in (136c).

- (136) a. If you haven't eaten yet, you **must** be starving.
b. If he mysteriously disappears during the full moon, he **might** be a werewolf.
c. If simple carbs make you really tired and you're always having to go to the bathroom, you $\emptyset_{\text{VEPIST}}$ have diabetes.

Kratzer's analysis can be formalized as follows:⁶⁹ consider the Kratzer-style truth-conditions for a modally-modified utterance (137a). A conditional would have the truth-conditions represented in (137b), which differs minimally in terms of the modal base: where the unmodified modal utterance *must q* has a modal base f , the conditional uses the modal base f^+ , which is identical to f except that the antecedent (i.e., the *if*-clause) is added to the set of propositions that the modal base takes into account.

- (137) a. $\llbracket \textit{must } q \rrbracket^{h,c} = 1$ iff
 $\forall w' \in \text{MAX}_{g(w)}(\cap f(w)) [q(w')]$
 b. $\llbracket \textit{if } p, \textit{must } q \rrbracket^{h,c} = 1$ iff
 $\forall w' \in \text{MAX}_{g(w)}(\cap f^+(w)) [q(w')]$
 Where $f^+(w) = f(w) \cup p$

This can be illustrated more concretely with the examples in (138).

- (138) a. The little boy must be lactose-intolerant.
 b. (If the little boy refuses the milkshake for breakfast), he must be lactose-intolerant.

While the unmodified modal utterance in (138a) is true iff in all of the most likely worlds that are compatible with what the speaker knows in w_0 , the boy is lactose-intolerant, the conditional in (138b) is true iff all of the most likely worlds that are compatible with what the speaker knows in w_0 , *which are also worlds in which the boy refuses the milkshake*, the boy is lactose-intolerant. This is a weaker claim than (138a) as (138a) makes this claim for both the worlds where the boy refuses the milkshake, and worlds where he drinks the milkshake.

One aspect of conditionals and modality that Kratzer largely abstracts away from in her earlier work is the interaction between modality, conditionals and temporality. As this interaction is the major theme underlying the Blackfoot data that I will be looking at, I now turn to some of the relevant research broaching this topic. In particular, I will address Ippolito (2003) and Condoravdi (2002), as well as Copley (2002, 2009).

3.2 Incorporating Temporal Perspective

How could modal claims interact with temporality? Condoravdi (2002) distinguishes between two times associated with a modal claim. One is the temporal perspective time, which is the time associated with the conversational backgrounds on which the modal claim is made - i.e., the time during which the propositions in the modal base and ordering source hold true. The other time of interest is the event's instantiation time. This is the time associated with the modal's

69. I base this off of Portner (2009)'s discussion of Kratzer.

prejacent event - i.e., the VP event's run/holding time. As an example, consider the following context-utterance pair:

(139) **Context:** David is grounded so that he can't go out to play with his new friend Luke. But Luke climbs up the creeper vine outside of David's window and into David's room, where they play until they both fell asleep. When David wakes up in the morning, Luke is gone. David says:

Luke must have climbed down the creeper while I was asleep.

We can distinguish between two times. The temporal perspective time for the claim "Luke must have climbed down the creeper while David was asleep" is the morning, when David is awake and considering the facts that (i) he remembers that Luke was in his room the night before, but (ii) Luke is no longer in his room. The instantiation/event time, on the other hand, is the time associated with Luke's climbing-down-the-creeper, which correlates with some time during which David was asleep.

A *present temporal perspective* is thus one like (139), where the time of utterance coincides with the time at which the facts in the modal base hold true. A *past temporal perspective* is one where the time of utterance follows the time at which the facts in the modal base hold true. The relationship between the temporal perspective time and the event time is called *temporal orientation*. Past, present and future temporal orientations are ones where the event time precedes, coincides with or follows the temporal perspective time respectively. (139), a case where the event in question precedes the facts upon which the modal claim is based, thus has a *past temporal orientation*.

Given the theoretical postulation of two distinct times for modal claims, the obvious question is whether languages show that their computational systems manipulate these times - i.e., do languages refer to these times? Quantify over them? In what follows, I summarize some of the linguistic literature which answers these questions in the affirmative. In this section I look at literature that focuses on the issue of temporal perspective time. The following section then discusses literature that focuses on a modal claim's temporal orientation.

3.2.1 Ippolito (2003): Conditionals with Past-Shifted Accessibility Relations

Recall the leading question for this section: do languages refer to temporal perspective times, or quantify over them? Ippolito (2003) argues that the morphological pastness of counterfactual conditionals like *If Quentin hadn't failed to pay his taxes, he wouldn't be in so much trouble* are exactly an instance of this - i.e., that the past morphology that turns the antecedent *have* into *had* is operating on the main clause modal's temporal perspective time. Note that Ippolito's work was concurrent with that of Condoravdi (2002); the term 'temporal perspective' had thus not become established

as it is now. Nonetheless, Ippolito talks about past morphology operating on the time associated with the accessibility relation, and this is exactly parallel to the definition of temporal perspective time presented above.

Because Ippolito (2003) focuses on conditional constructions, and because there are various different terms for the different parts of a conditional, before discussing Ippolito (2003) in detail, I will clarify some of my terminological choices. First, I will follow the terminological conventions which label the *if*-clause (p) an *antecedent*, and the main clause (q) a *consequent*.

(140) If p, q

The second terminological issue to be aware of is the categorization of (at least English) conditionals into two types: indicative and subjunctive conditionals. Examples of these two types of conditionals are given below.

(141) **Context:** We're planning a party for tomorrow. We are wondering whether we should invite Richard, since his ex-girlfriend Iphigina is invited.

- a. If Richard **comes**, Iphigina **will** leave. indicative
- b. If Richard **came**, Iphigina **would** leave. subjunctive

This distinction is morphological, with semantic consequences, although researchers vary as to how they characterize both the morphological and semantic properties that differentiate the two types of conditionals. The general semantic consequence the literature associates with the indicative/subjunctive distinction is one of epistemic uncertainty vs counterfactuality respectively - i.e., in general, indicative conditional antecedents are subject to epistemic uncertainty (p may or may not be true), while subjunctive conditional antecedents are, in general, counterfactual (p is known to be false). While this general semantic characterization of epistemic uncertainty vs counterfactuality has long had counterexamples, the generalization nonetheless remains influential because it does properly characterize a large portion of the data. (142) is based on Anderson (1951)'s famous counterexample.

(142) **Context:** Two doctors are trying to determine what is behind Jones' illness. One believes Jones has been poisoned with arsenic, but his colleague stubbornly doesn't believe him. The first doctor tries to convince his colleague with evidence and reasoning:

If Jones had taken arsenic, he would be showing exactly the symptoms that he displays now!

The observation is that the doctor can use a subjunctive conditional antecedent even though he does not think the antecedent proposition is counterfactual - indeed, he believes the antecedent

proposition holds true in w_0 .⁷⁰ Given such examples, counterfactuality cannot be hardwired into the semantics of subjunctive conditionals. Because the proper characterization of English past subjunctive conditionals is not within the scope of this dissertation, for what follows I will assume that subjunctive conditionals can informally be characterized by a counterfactual implicature - i.e., a (cancellable) assumption that the antecedent is false. Also, because Ippolito (2003) is interested in a specific type of subjunctive conditional, I will focus on subjunctive conditionals, and leave further discussion of indicative conditionals for chapters 5 and 8.

Notice that subjunctive conditionals in English (e.g. 141b) are characterized by past morphology in their antecedent, which does not seem to be interpreted with a conventional past meaning. Palmer (1986, 2001) and Iatridou (2000) suggest that this past morphology is not a real past, but a “modal-past.” This means that it does not indicate a lack of identity between the antecedent’s reference time and the utterance time (as conventional past morphology does), but rather indicates a lack of identity between the world described by the antecedent and the utterance world. Ippolito (2003) calls subjunctive conditionals like (141b) ‘non-past subjunctive conditionals,’ contrasting them with ‘past subjunctive conditional’ examples like (143a) and (b).

- (143) a. If Marcus **had come** yesterday, Iphigina **would have** stayed.
 b. If Marcus **had come** tomorrow, Iphigina **would have** stayed.

These conditionals are characterized by past perfect (or ‘pluperfect’) morphology in their antecedent, which both Palmer (1986, 2001) and Iatridou (2000) analyze as the morphological realization of two layers of past morphology (see Arregui (2005), however, who treats the perfect morphology as a perfect).⁷¹ One layer of past, as for the ‘non-past subjunctive conditionals,’ acts to indicate a lack of identity between the antecedent world and the utterance world; they analyse the other layer of past morphology as having the conventional meaning of a past operator - i.e., to indicate that the antecedent’s reference time precedes the utterance time. Ippolito (2003) points out

70. My intuition is that the doctor uses the past subjunctive conditional in order to suggest that his reasoning is completely objective - i.e., to convey the fact that whether or not (the first doctor believes that) Jones took arsenic, all possible situations where Jones takes arsenic are followed by situations where Jones shows symptoms very much like the ones they observe. Dancygier & Sweetser (2005) present a similar intuition, suggesting that subjunctive conditionals indicate **EPISTEMIC DISTANCE** - i.e., one uses subjunctive conditionals to present one’s self as “distanced from a belief” for various reasons.

71. Arregui (2005) looks at the contrast between examples like the following:

(i) **S1:** Can you look after my plants next week?

S2: Of course, but I’m rather nervous. If your plants **died** next week, I would be very upset.

(ii) **S1:** Don’t worry about looking after my plants, they died yesterday.

S2: I’m sorry, but also relieved. If your plants **had died** next week, I would have been very upset.

While (1) gets a non-counterfactual reading, (2) has a counterfactual reading. She proposes that the form in (1) is perfective, where perfective aspect is associated with a deictic free event variable that anchors the antecedent to the actual world. This is why it lacks a counterfactual reading. The perfect form in (2), on the other hand, being stativized/perfect, lacks this deictic requirement encoded in the (null/default) perfective. This is why it has a counterfactual interpretation.

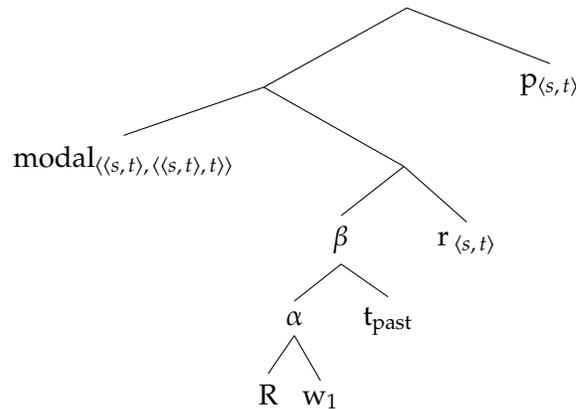
that while this may be the case for (143a), which she terms a ‘standard past subjunctive conditional,’ it cannot be the case for (143b), which appears to be evaluated with respect to a future reference time. Ippolito calls these ‘mismatched past counterfactuals,’ and raises the following question: If this extra layer of past is not locating the antecedent in the past, what semantic contribution does it have? She proposes that this extra layer of past has the conventional contribution that past morphology usually does, but that rather than locating the time of the antecedent in the past, it locates the time of the accessibility relation associated with the main-clause modal in the past. This is the part of Ippolito (2003)’s analysis that is important for the framework I assume - i.e., that temporal operators like the past can bind temporal arguments associated with the accessibility relation/temporal perspective of a modal/conditional construction. In the interest of completeness, in the remainder of this subsection I outline how Ippolito (2003) uses this to analyze a contrast she observes between two different kinds of subjunctive conditionals. The reader should note, however, that what follows is not directly relevant for the analysis I will present in later chapters and thus can be skimmed.

Ippolito (2003) observes that standard and mismatched past subjunctive conditionals differ in terms of whether or not an Anderson (1951)-style counterexample is possible. She provides the example in (144) to show that you cannot felicitously construct an Anderson (1951)-style discourse for a mismatched past subjunctive.

(144) # If Charlie had gone to Boston by train tomorrow, Lucy would have found in his pocket the ticket that she in fact found. So he must be going to Boston tomorrow. Ippolito (2003, pp. 147)

From this, Ippolito claims that whereas the standard past subjunctive’s counterfactual implicature seems to be exactly that - i.e., a cancellable implicature, where context can yield an Anderson-type conditional, the same is not true for a mismatched past subjunctive’s counterfactual claim. A mismatched past subjunctive counterfactual claim thus requires additional machinery in order to account for the impossibility of sequences like (144). Adopting a Lewis-Kratzer style semantics for conditionals (although abstracting away from the decomposition of the accessibility relation and ordering source), Ippolito adopts a structure as below:

(145) If r, modal-p



R = Accessibility relation

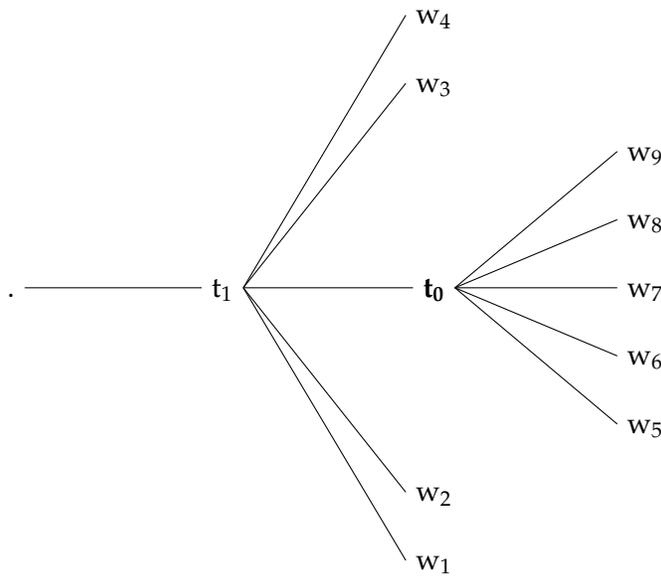
α = worlds compatible with facts in w_1

β = worlds compatible with facts in w_1 at t_{past}

Notice that unlike the accessibility relations in Kratzer (1989) and Lewis (1975), Ippolito's accessibility relation depends on more than just the world of evaluation. The accessibility relation also depends on a time of evaluation. She formalizes this by having the modal's accessibility relation take a world-time pair, as opposed to a world, as its initial argument. The tree in (145) represents a schönfinkled version of her proposal, whereby the accessibility relation first takes a world argument, and then a time argument.⁷² Thus an epistemic modal's meaning depends on what the speaker knows in w at a specific time t , whereas a deontic modal depends on what laws hold in w at a specific time t . Ippolito suggests that the time variable gets its value as the utterance time t_0 , unless specified otherwise. The additional past morphology, she proposes, restricts the accessibility relation of *would* in the consequent so that we are not considering the worlds that are accessible at the time of utterance, but the worlds that were accessible at some past time. Adopting a branching-timeline view of the future (cf. Prior (1957, 2003, 1967), Thomason (1970), McCall (1984), Belnap (1992)), where fewer and fewer possible worlds are accessible to us as facts accumulate, this means that a past modal claim quantifies over more worlds than a present modal claim. This is schematized by the diagram in (146) - while at the past time t_1 , the worlds $w_1, w_2, w_3, w_4, w_5, w_6, w_7, w_8$ and w_9 are accessible, by t_0 the facts of w_0 have settled such that worlds w_1, w_2, w_3, w_4 have been ruled out as candidates for w_0 . In other words, by t_0 only the worlds w_5, w_6, w_7, w_8 and w_9 are accessible.

72. Schönfinkling, or Currying, is a way of translating a function that takes multiple arguments into a sequence of functions that take single arguments. This allows for a compositional syntax-semantics interface.

(146) Branching Futures



In order to account for the contrast between the standard and mismatched past subjunctive conditionals represented by (143a) and (143b) respectively, Ippolito (2003) relies on some additional felicity conditions: she proposes that any presuppositions associated with the antecedent of a conditional must be compatible with the context set at the time of evaluation (i.e., the time associated with the accessibility relation). These felicity conditions are represented below; p stands for any presupposition associated with the antecedent, and $C(t)$ stands for the “context set at time t .”⁷³

(147) Felicity Condition for Non-Past Subjunctive Conditionals

$$p \cap C(t_0) \neq \emptyset$$

The presuppositions associated with the antecedent of non-past subjunctive conditionals cannot be incompatible with the context set at time t_0 .

(148) Felicity Condition for Past Subjunctive Conditionals

$$p \cap C(t') \neq \emptyset$$

(where $t' < t_0$)

The presuppositions associated with the antecedent of past subjunctive conditionals cannot be incompatible with the context set at time t' preceding t_0 .

These felicity conditions follow from a more general hypothesis that the felicity conditions for a subjunctive conditional correlate with the temporal argument of the conditional’s accessibility

73. Recall Stalnaker (1974, 1998)’s notion of context set from chapter 1 - the set of worlds that could be, for all the interlocuters know, the actual world w_0 .

relation. The final ingredient in Ippolito (2003)'s analysis is the proposal that presuppositions (in addition to main-clause assertions) can participate in Gricean competition. Given this assumption, consider the fact that a past subjunctive conditional claims that the presuppositions of the antecedent are compatible with the worlds accessible from some former time, t' . This is a weaker claim than claiming that the presuppositions of the antecedent are compatible with a present accessibility state. Assuming the Gricean Maxim of Informativity (i.e., that a speaker will make the strongest relevant claim possible), making a weaker claim will trigger an implicature that the stronger claim (i.e., that the presuppositions of the antecedent hold at t_0) is false. If a presupposition of the antecedent does not hold at the time of utterance, there is no way that the antecedent can be true. This, Ippolito proposes, is what hardwires the counterfactuality of the mismatched past subjunctive in (143), accounting for why mismatched past subjunctives are infelicitous in Anderson (1951)-style discourse contexts.⁷⁴

3.2.2 Condoravdi (2002): Temporal Orientation and Perspective

The thing to take away from the above discussion (at least for the purposes of this dissertation) is how Ippolito (2003) incorporates temporality into a Lewis-Kratzerian framework for conditionals/modality. Ippolito (2003) replaces the accessibility relation's world-argument with a world-time pair, and this allows tense to affect the temporal interpretation of the antecedent (via its presuppositions). Like many other researchers of conditionals, however, Ippolito (2003) is primarily interested in the morphology and semantics associated with the antecedent of the conditional; she does not make much mention of the morphology or semantics of the consequent. If we are adopting a Kratzerian view of conditionals, however, investigating the temporal morphosemantics of consequents and investigating the temporal morphosemantics of modal utterances in general should be the same topic. For this we can look at Condoravdi (2002), who not only provides an analysis very similar to that of Ippolito (2003), but also goes more in-depth with respect to the temporal interpretation of modal main clauses.

Condoravdi (2002) famously addresses the ambiguity of sentences like (149):

(149) They might have won the game.

- a. **Context A:** I had to leave before they finished the game, but when I left the Canucks were doing pretty well; they were only trailing by one and they had momentum. If they kept up their momentum and didn't take any stupid penalties, they might have won.

74. The reader may be wondering: if the analysis depends on Gricean competition, where Gricean implicatures are characteristically cancelable, why can't the counterfactuality of the past mismatched counterfactual be cancelled? I suggest this may have to do with the fact that the Gricean competition is between presuppositions, as opposed to assertions, which are *at-issue* in the sense of Simons et al. (2010), where non-at-issue content cannot be targeted for challenge/cancellation in the same way as assertions.

(EPISTEMIC UNCERTAINTY)

- b. **Context B:** The Canucks lost the game yesterday. But if the referee hadn't called so many stupid penalties, they might have won.
(COUNTERFACTUAL)

The reading in A is one where the modal's prejacent - i.e., whether or not they won the game - is subject to epistemic uncertainty. As far as the speaker knows, they may have won the game, or they may not have. The reading in B is one where the modal's prejacent is not subject to epistemic uncertainty. Rather, the speaker is fully aware of its truth-conditional status as false. Notice that the context in A makes use of an indicative conditional (i.e., one where simple past morphology in the antecedent is interpreted with a conventional past meaning, locating the antecedent event in the past), and the context in B makes use of a (standard) past-subjunctive conditional (i.e., past perfect/pluperfect morphology).

Condoravdi proposes that reading A is derived when the modal *might* scopes over the perfect *have*, resulting in a present time of evaluation for the modal (i.e., the time at which we determine our accessible worlds is present), and an anterior-shifted event time of winning. Temporal operators above the modal determine temporal perspective; temporal operators below the modal determine temporal orientation. The scopal order represented in (150) thus yields reading A, which is categorized as having present (epistemic) perspective, and "past" or anterior orientation.

(150) PRESENT[might [PERFECT [VP]]]

Condoravdi proposes that Reading B is derived when the temporal operator - i.e., the perfect *have* - scopes over and operates on the modal *might*. The perfect thus shifts the modal's temporal perspective to an anterior time. Under the branching-times assumption that the set of metaphysically accessible worlds decreases over time, this past-shifting of the evaluation time widens the domain of quantification, making more worlds accessible. Consider now the fact that a MOD-p utterance asserts that p is compatible with the domain of quantification. The question is why a speaker would choose to make this claim with respect to a past-shifted accessibility relation, as opposed to a present one. Condoravdi reasonably suggests that speakers resort to this when p is not compatible with the worlds made available from a present accessibility relation. This gives us the implicature that p is false at the time of utterance (i.e., the counterfactual implicature).

Notice that the temporal orientation of reading B is future/prospective; the event time (had the event occurred) is located after the time of evaluation. This is the case when the VP is eventive; the reader can check the original article for examples showing that if the VP predicate is stative, either a future/prospective or present/coinciding time is available. Condoravdi (2002) accounts for this by directly encoding the generalisations in an AT relation, shown in (151), which is sensitive to

the eventive/stative distinction. Temporal-aspectual operators like PRESENT and PERFECT make use of the AT relation - Condoravdi's denotations for these are given in (152).

- (151) $AT(t,w,P) =$
 a. If P is eventive: $\exists e[P(w)(e) \& \tau(e, w) \subseteq t]$
 b. If P is stative: $\exists e[P(w)(e) \& \tau(e, w) \circ t]$
- (152) a. $\llbracket PRESENT \rrbracket^{h,c} = \lambda P. \lambda w. [AT(now, w, P)]$
 b. $\llbracket PERFECT \rrbracket^{h,c} = \lambda P. \lambda w. \lambda t. \exists t' [t' < t \& AT(t', w, P)]$

Modals like *might* and *will/would* (in addition to their modal properties), are treated as aspectual elements that map properties of events or times (VPs) to properties of times.⁷⁵ They contain AT in their lexical denotation, with the specification that the temporal instantiation holds of an interval $[t, _)$, an open interval beginning at t. This is represented with the denotations below, where the notation MB stands in as a variable for the modal base function/accessibility relation.

- (153) a. $\llbracket may/might_{MB} \rrbracket^{h,c} = \lambda P. \lambda w. \lambda t. \exists w' [w' \in MB(w, t) \& AT([t, _), w', P)]$
 b. $\llbracket will_{MB} \rrbracket^{h,c} = \lambda P. \lambda w. \lambda t. \forall w' [w' \in MB(w, t) \& AT([t, _), w', P)]$

These ingredients, with the structure represented in (154), derive the “past”/anterior perspective and “future”/prospective orientation for the counterfactual readings (i.e., reading B).

- (154) PRESENT PERFECT[might [[VP]]]

In addition to making a distinction with respect to the temporal perspective and orientation of the two readings, Condoravdi claims that the distinct readings are evaluated with respect to different types of modal bases - whereas Reading A is interpreted with respect to an epistemic modal base, Reading B is interpreted with respect to a metaphysical modal base.⁷⁶ In order to rule out a reading of (149) whereby we have a present-perspective *metaphysical* modal, with past-orientation, Condoravdi also proposes that MOD-p utterances must satisfy a Diversity Condition - i.e., modals must be evaluated against a modal base that contains both p and $\neg p$ worlds. The Diversity Condition is formalized in (155), where the notation cg stands for Stalnaker (1974, 1998)'s notion of **COMMON GROUND**, introduced in chapter 1: the common ground is the set of propositions that the interlocuters (speaker and hearer) agree on as true.

75. I'll assume, following Abusch (1985), that *will* and *would* are the past and present morphological realizations of an underlying prospective modal WOLL.

76. Recall that while an epistemic modal base yields worlds that are compatible with what the speaker knows in w at t, a metaphysical modal base yields worlds that are compatible with the all of the facts (known or otherwise) of w at t.

(155) Condoravdi's Diversity Condition:

There is a $w \in c_g$ and $w', w'' \in MB(w, t)$ such that:
 $AT([t, -], w', P)$ and $\neg AT([t, -], w'', P)$

This rules out a present-perspective past-orientation reading with a metaphysical modal base; the fact that an event temporally precedes a present temporal perspective time entails that the present-perspective *metaphysical* modal base is non-diverse. This is because in the branching-time metaphysical framework that Condoravdi (2002) adopts (à la Prior (1957, 2003, 1967), Thomason (1970), McCall (1984), Belnap (1992)), past events are necessary events. All of the metaphysically accessible worlds are thus worlds where the truth-value of p match, violating the Diversity Condition. The scope relations resulting in present-perspective and past-orientation must thus be interpreted with respect to an *epistemic* modal base, where the epistemically accessible worlds may be a combination of p and $\neg p$ worlds.

In summary, Condoravdi, like Ippolito, proposes a system whereby a modal's accessibility relation is associated with a time (the temporal perspective) which can be operated upon by temporal operators like a perfect. Condoravdi (2002) additionally makes explicit the temporal relation between this time and the temporal instantiation of the event with her temporal orientation relation. She formalizes temporal orientation as an interaction between familiar temporal operators (like the perfect), and temporal specifications on an instantiation relation, AT , specifically encoded into modals. In section 3.3.1, we will look at an alternative way of encoding temporal orientation.⁷⁷

In terms of the types of temporal operators that we have seen proposed to operate on a modal, so far Ippolito (2003) and Condoravdi (2002), while differing with respect to whether they assume it is tense or aspect that operates on the temporal perspective time, nonetheless coincide in that the temporal perspective time is subject to an operator which shifts it to an anterior time. In the next section, I discuss Copley (2002, 2009) who argues that many different types of aspects can operate on (at least future) modals. I will address in particular her discussion of how a modal can be operated upon by a progressive-like aspect, and what semantic consequences follow.

3.2.3 Copley (2002, 2009): The Semantics of the Future

Copley (2002, 2009) is interested in ways of expressing the future in English. She identifies two categories, futurates and futures, and further subdivides those two categories according to their aspectual properties, both morphological and semantic. Futurates, illustrated below in (156), are expressions that talk about future events, in the absence of overt future morphology.

77. Condoravdi (2002) also allows the perfect, in conjunction with her AT relation, to indicate temporal orientation. Kratzer (2011) and Matthewson (2012) generalize this approach, where temporal orientation is uniformly encoded with aspectual operators (like perfect and prospective) which apply to the VP pre-jacent prior to being selected by the modal.

- (156) a. The death-row prisoner **dies** tomorrow at 5pm.
(SIMPLE FUTURATE)
- b. The new iphone **is being revealed** tomorrow at 12pm.
(PROGRESSIVE FUTURATE)

Futures, illustrated in (157), likewise talk about future events, but are marked with the overt future markers *will* and *be going to*.

- (157) a. The death-row prisoner **will** die tomorrow at 5pm.
(SIMPLE FUTURE)
- b. The new iphone **is going to** be revealed tomorrow at 12pm.
(PROGRESSIVE FUTURE)

Copley assumes, following the majority of contemporary analyses (Enç (1996), Palmer (1986, 2001), Condoravdi (2002), a.o.) that *will* and *be going to* pattern syntactically and semantically like modal elements, as opposed to patterning like tense elements.⁷⁸ For our purposes, the relevant empirical generalization that Copley (2002, 2009) aims to account for is illustrated in (158):

- (158) **Context:** Seen on a billboard:
- a. If you want, we'll change your oil in Madeira.
- b. If you want, # we are going to change your oil in Madeira.

Copley (2002, 2009) notices that in an offer context, the bare future *will* is felicitous, but the progressive future *be going to* is not. She proposes an analysis based on two factors: one, felicity conditions for offering, and two, how the progressive aspect morphologically visible in *be going to* affects the future modal's domain of quantification. She proposes that in order for an offer to be felicitous, the speaker/offerer must be able to ensure that (i) if the hearer wants p, the speaker can achieve p, and (ii) if the hearer wants not-p, the speaker can ensure that not-p. The progressive aspect of *be going to*, Copley proposes, results in an assertion that is incompatible with the second condition required for a felicitous offering - i.e., it is incompatible with the requirement that if the hearer wants not-p, not-p is what will happen. The discussion of Copley's analysis that follows has two purposes. One, as mentioned above, to show how one can implement an analysis wherein aspect operates on a modal's temporal perspective time. Second, to showcase an analysis of futures with which we can later compare the analysis I propose for English *will* and Blackfoot *áak-* in chapters 4 and 6. Although I will not adopt Copley's formalizations completely, the spirit of the analysis is as follows:

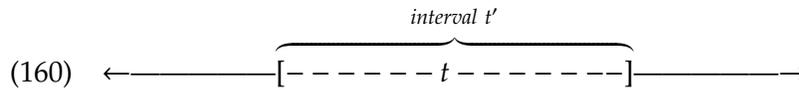
78. I will follow this approach, and later present data in chapter 4 showing that the Blackfoot future elements *áak-* and *áyaak-* indeed pattern like modal elements, as opposed to tenses (cf. Reis Silva (2009b), Reis Silva & Glougie (2007)).

First assume a semantics for the simple future *will* like (159) where *f* indicates a metaphysical/circumstantial modal base and *g* indicates a bouletic ordering source.⁷⁹ The “director” mentioned in the definition of the bouletic ordering source is an entity that determines what happens in the future. In cases where it is animate, it generally refers to the subject of the sentence.⁸⁰

$$(159) \quad \llbracket will \rrbracket^{h,c} = \lambda P. \lambda t. \lambda w. \forall w' \in MAX_{g(w,t)}(\cap f(w,t)[\exists e[P(e)(w')]])^{81}$$

- a. *f* is a metaphysical/circumstantial modal base - i.e., consisting of relevant facts in *w*.
- b. *g* is a bouletic ordering source (i.e., consisting of the plans, commitments and desires of the “director” in *w*.)

Second, assume that progressive aspect has the effect of expanding the time for which its prejacent holds true - i.e., whereas a bare predicate is asserted to hold at time *t*, the progressive requires that the predicate holds for *t'*, an interval containing *t*. The difference between (run)(*t*) and PROG(run)(*t*) is thus that running is asserted to hold during time *t*, but PROG(run)(*t*) is true iff running holds for an interval *t'*, which contains *t*.



A simplified denotation for the progressive is given in (161).⁸²

$$(161) \quad \llbracket PROG \rrbracket^{h,c} = \lambda P. \lambda t. \exists t' [t \subset t' \& P(t')]$$

With these semantic ingredients, Copley (2002, 2009) proposes that the morphological breakdown of *be going to* is compositional - i.e., *be going to* is a future that has been operated upon by a progressive operator. This means that instead of quantifying over worlds that are compatible with the speaker’s commitments/desires/plans at *t*, the modal quantifies over worlds compatible with the speaker’s commitments/desires/plans for *t'*, an interval containing *t*. Copley (2009) further proposes that offers are associated with a covert conditional antecedent “if you want *p*,” where the covert conditional antecedent restricts a covert modal that scopes above *be going to*. This covert modal, and its antecedent “you want *p*” is interpreted with respect to the reference time, *t*, so that we only consider worlds where “you want *p* at *t*.” Thus worlds where the addressee wants *p* at

79. Copley (2002, 2009) actually encodes the bouletic ordering source and metaphysical modal base into a function ALL_b , instead of the more standardized notational conventions I’ve chosen to present here.

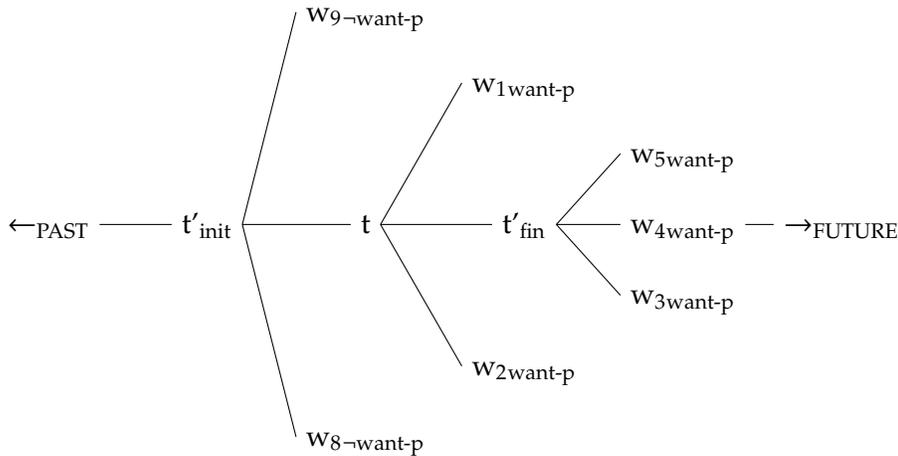
80. Although in cases with inanimate subjects created by humans, such as orange-crushing machines, “the director” can refer to the designer of the machine. In case of inanimate subjects created by nature (e.g. the sun), the director can be thought of as the world, whose “plans and commitments” are the law-like properties of the world.

81. The reader may note that Copley does not actually encode future-orientation or prospective aspect into her denotation. It is unclear to me whether she assumes that a prospective orientation follows from her definition of a director, where the “director” determines what happens in the future, or whether she (like I do in the chapters 4 and 6) deliberately avoids encoding a prospective orientation because she does not think a prospective orientation is part of the core semantics of modals like “will” and “be going to.”

82. This is simplified as I abstract away from fact that the English *be going to*, despite its classification as a progressive, (i) can have generic readings, and (ii) requires a modal semantics given that it gives rise to imperfective paradox effects.

time t , w'' , are asserted to be such that for the time period t'' (which contains t), all of the worlds accessible from w'' , w' , are worlds where d is committed to p -ing and has the wherewithal to ensure that p obtains. In other words, all of the worlds bouletically accessible from w' are worlds where p obtains. In order for this claim to make sense, we would either have to conclude one of two things. One, that a state of affairs that holds at t (namely, whether or not the addressee wants p) can affect whether a state of affairs holds for t'' (whether or not the director is committed to p -ing), where t' includes times that precede t . In other words, we would assume the possibility of backwards causation (very strange!). The second possibility is that the w'' worlds are already such that the consequent state of affairs for t'' is imminent, whether or not the antecedent holds - i.e., that for the interval t' , the director is committed to p -ing whether or not the addressee wants p at t . This would only be the case if the world that the w'' worlds are accessible from, w_0 , is such that for t'' , the director is (already) committed to p -ing. Since w_0 may be a world where the addressee doesn't want p , its existence (a world where the addressee wants not p , but the director is committed to p -ing) violates Copley's offering condition.⁸³ We can schematize this with a simplified picture as follows, which abstracts away from the level of complexity introduced by the covert modal. The reference time is marked as t ; the interval t' begins at t'_{initial} and ends at t'_{final} .

(162)



In this diagram we see that there are worlds accessible from w_0 at the times in t' prior to t , which are worlds where the hearer does not want p (w_8 and w_9). These are the worlds that branch off during t' prior to t . Because all of the worlds that branch off during t' , whether they do so before or after t , are nonetheless asserted to be p -worlds, however, the resulting semantics contradicts the second requirement for a felicitous offering - i.e., that if the hearer at t wants that not- p , the

83. This explanation works under the assumption that the null modal, MOD, is a circumstantial one, so that the worlds, w'' , accessible from w_0 , are ones that are consistent with the facts in w_0 - i.e., where MOD is such that w_0 is accessible from itself. If MOD is purely bouletic, however - e.g., if the worlds, w'' , are those compatible with what x wants in w_0 , then it won't work, as w_0 need not be bouletically accessible from itself. In this case, we would not be making any claim about w_0 , and we wouldn't be able to derive the infelicity of the Madeira cases. Although Copley does not specify what kind of modal MOD is, I will assume a circumstantial modal base and the explanation presented here.

speaker/director can ensure not-p.

The analysis presented in Copley (2009) is complex (necessarily, given the complicated data). The relevant insight to take away for my purposes, however, is that Copley (2002, 2009) essentially treats the future modal (her ALL_b) as an operator that yields a predicate of times, which aspectual operators like the progressive can apply to. The progressive operates on the evaluation times associated with the modal's ordering source - i.e., the time at which the director's plans/commitments/desires hold. The Blackfoot future elements *áak-* and *áyaak-* pattern in a highly similar manner (cf. Reis Silva (2009b), Reis Silva & Glougie (2007)).

3.3 Incorporating Temporal Orientation

Copley (2002, 2009), like Ippolito (2003), focuses on how temporal-aspectual operators interact with the temporal perspective of modals - i.e., how temporality affects the accessibility of possible worlds. Matthewson (2012), on the other hand, focuses on temporal orientation, and presents an alternate formalization from the one presented in Condoravdi (2002). She further uses her analysis to account for crosslinguistic variation with respect to the presence or absence of **ACTUALITY ENTAILMENTS** associated with ability modals. In this section, I summarize her paper. I follow this with a discussion of ability attributions. I focus in particular on a STIT ("see-to-it-that") approach to ability attributions, where the two main STIT operators differ mainly in whether they encode a past or future temporal orientation. I finish the chapter by discussing Deo (2009)'s analysis of the imperfective; Deo (2009)'s imperfective analysis differs from the temporal-modal approaches we've seen so far in that the imperfective, as an aspect, hardwires its temporal orientation into its lexical denotation.

3.3.1 Matthewson (2012); Kratzer (2011): Prospective Aspect

Recall that Condoravdi (2002) accounts for the future temporal orientation associated with modals like *will* and *might*⁸⁴ by directly encoding it into the modal's denotation: *will* and *might* assert that their prejacent holds of [t,...), an interval beginning at t and extending infinitely into the future.⁸⁵ Matthewson (2012) instead (converging with Kratzer (2011)), proposes that the "future" orientation of *will* and *might* is given by viewpoint aspect. Thus just as Condoravdi (2002) derives the "past"/anterior temporal orientation of (149a), repeated below in (163), by having perfect viewpoint aspect apply to the VP predicate prior to the application of *might*, the "future"/prospective temporal orientation of (149b) is derived by having a prospective viewpoint aspect apply to the VP predicate prior to the application of "might".⁸⁶ All modals with a "future"/prospective orientation, she suggests, derive their temporal orientation via a prospective viewpoint aspect.

84. The reading of *might* where no aspectual operator intervenes between *might* and the VP predicate.

85. Where t, recall, is the time of evaluation associated with the accessibility relation.

86. Matthewson (2012) proposes an overt prospective aspect *dim* for Gitksan; Kratzer (2011) proposes a null prospective aspect for English.

(163) They might have won the game.

a. **Context A:** I had to leave before they finished the game, but when I left the Canucks were doing pretty well; they were only trailing by one and they had momentum. If they kept up their momentum and didn't take any stupid penalties, they might have won.

(EPISTEMIC UNCERTAINTY: PRESENT PERSPECTIVE, ANTERIOR ORIENTATION)

b. **Context B:** The Canucks lost the game yesterday. But if the referee hadn't called so many stupid penalties, they might have won.

(COUNTERFACTUAL: PAST PERSPECTIVE, PROSPECTIVE ORIENTATION)

To avoid unwieldy terms like “future”/prospective and “past”/anterior, I will take a stance in terms of terminology now. Because Matthewson (2012) follows Condoravdi (2002) in assuming that an unembedded modal's temporal perspective is given by tense, I will use the tense terms ‘past,’ ‘present’ and ‘future’ to talk about temporal perspective. When talking about temporal orientation, which Matthewson (2012) takes to be determined by viewpoint aspect, I will use viewpoint-aspect terms ‘anterior,’ ‘coincident’ and ‘prospective.’⁸⁷

The empirical data underlying Matthewson (2012)'s claim comes from Gitksan, a Tsimshianic language spoken in north-western British Columbia. She shows that any forward shifting of times in Gitksan requires the presence of an auxiliary *dim*. This is true for standard future claims (i.e., claims that would be expressed by a futurate or future-expression in English), future-oriented epistemic claims, and the prospective orientation associated with circumstantial modals (e.g., pure circumstantial, ability and counterfactual claims). She proposes that *dim* is an overt version of Kratzer (2011)'s prospective aspect, and then goes on to propose that crosslinguistic variation with respect to whether an ability attribution has actuality entailments is conditioned by whether prospective aspect is obligatory or optional. Because one of the languages Matthewson (2012) uses to illustrate her crosslinguistic variation in actuality entailments is Blackfoot,⁸⁸ what follows is a brief discussion of actuality entailments.

The phenomenon of actuality entailments appears in several languages crosslinguistically and was first observed by Bhatt (1999, 2006), and taken up by Hacquard (2006). These researchers focus on Hindi and English, and French and Italian respectively. The observation is that perfectly-interpreted ability attributions, despite being (or appearing to be) modal expressions, entail that the modal's prejacent event occur in the actual world. The examples below (minus translations)

87. I will use the term ‘anterior’ as opposed to ‘perfect’ only because at this point I only care that the newly introduced reference/modal time temporally precedes the event time, and I prefer to save the term ‘perfect’ for linguistic elements which have clearly stativizing properties (i.e., an operator that yields a predicate true of all times, *t*, that follow the event time). I should probably actually use the term ‘posterior’ in place of ‘prospective,’ and save ‘prospective’ for an exact mirror of the perfect - i.e., a stativizing operator that yields a predicate that is true of all times, *t*, that precede the event time (which is what I will in fact propose for Blackfoot in chapters 4 and 5). However, I will stick with ‘prospective’ in order not to veer too far away from familiar terminology.

88. And because I will argue for a distinct source for Blackfoot's actuality entailments shortly.

are from Hacquard (2006).

(164) a. PERFECTIVE ASPECT (with actuality entailment)

Pour aller au zoo, Jane a pu prendre le train
 For go to-the.MASC zoo, Jane **have can.PST.PFV** take the.MASC train

'To go to the zoo, Jane was able to take the train.'
 (Only OK in contexts where Jane took the train in w_0 .)

b. IMPERFECTIVE ASPECT (no actuality entailment)

Pour aller au zoo, Jane pouvait prendre le train
 For go to-the.MASC zoo, Jane **can.PST.IMP** take the.MASC train

'To go to the zoo, Jane could take the train.'
 (OK if Jane took the train in w_0 , or didn't.)

Hacquard (2006, pp. 13)

Mari & Martin (2007) and Davis et al. (2010), however, call this generalization into question. Mari & Martin (2007) point out that the generalization that Hacquard and Bhatt observe is not quite right: actuality entailments fail to arise in French with circumstantial modals when the temporal orientation is prospective. Actuality entailments only arise with anterior or coincident temporal orientations. Davis et al. (2010), taking a crosslinguistic perspective, survey four understudied languages and similarly show that Hacquard and Bhatt (2006)'s perfective/imperfective generalization does not hold. Their data show that (i) some languages lack actuality entailments with ability attributions, whether perfective or imperfective, and (ii) some languages have ability attributions in both perfective and imperfective contexts.

Observing that Gitksan is a type (i) language - i.e., one that uniformly lacks actuality entailments - and that its ability modal obligatorily requires the prospective *dim*, Matthewson (2012) proposes that the absence of an actuality entailment correlates with the presence of prospective aspect, and adopts the formalization presented in Kratzer (2011)'s analysis of circumstantial modals.

Kratzer (2011) proposes that circumstantial modals like *can* make claims about counterparts of the arguments of the sentence.⁸⁹ A denotation for *can* is given below.

(165) $\llbracket can \rrbracket^{h,c} = \lambda R. \lambda x. \lambda t. \exists x' \exists t' [\langle x', t' \rangle \in CP\langle x, t \rangle \& R(x')(t')]$ (Kratzer (2011))

The denotation takes a prejacent property, *R*, an individual, *x*, and time *t*, and then asserts that there is some individual, *x'* and time, *t'*, such that *x'* is a counterpart of *x* at time *t*, and *R* holds of *x'* at *t'*. As I understand it, the counterparts that the circumstantial modal quantifies over, however, are not just any counterparts. They must be very good (i.e., very similar) counterparts. In order to count as a good enough counterpart to be a member of $CP\langle x, t \rangle$, the internal and external

89. These are claims about all of the arguments of the sentence. For our purposes, we'll look at simple intransitive cases so that we need only look at one argument.

circumstances of the counterpart must exactly match those of the subject, x , at time t . Thus a sentence like (166) has truth conditions like those in (167).

(166) Mary could climb those stairs yesterday.

(167) 'There is a counterpart of Mary who lives in a world very much like ours, whose circumstances yesterday exactly matched those of Mary yesterday, and who climbed a counterpart of those stairs yesterday.'
(Kratzer 2011)

Kratzer's idea is that any counterpart of Mary who is similar enough to Mary and her circumstances to satisfy the membership requirements of $CP\langle x, t \rangle$ has circumstances so similar to Mary that the counterpart will do exactly what Mary does at t . This, of course, goes both ways, which means that because the counterpart is asserted to have achieved P , Mary must have done so too. Thus, despite the presence of a modal, the modal's prejacent event occurring in the actual world is entailed. Kratzer (2011)'s CP relation is crucially sensitive to the temporal orientation of the ability modal, however. The strict CP relation only has to hold between Mary and her counterpart for t , the context time (in our terms, the temporal perspective time). Given this restriction, she argues, a prospective temporal orientation is predicted to take away actuality entailments: prospective aspect shifts the ability modal's prejacent event into the future, outside of t . Thus at the time of the event, the strict CP relation between Mary and her counterpart need no longer hold, and Mary and her counterpart need not behave in the same manner. This means that while the speaker is committed to the claim that Mary's counterpart P 's at some point in the future, the speaker is not committed to the claim that Mary do so. No actuality entailment is derived.

Matthewson (2012) adopts this approach from Kratzer whereby a prospective temporal orientation is predicted to take away actuality entailments. She states that "when prospective aspect is present, Mary's counterpart is only asserted to have (had) the potential" to realize the event at some time following the reference time, which does not entail that Mary does so.

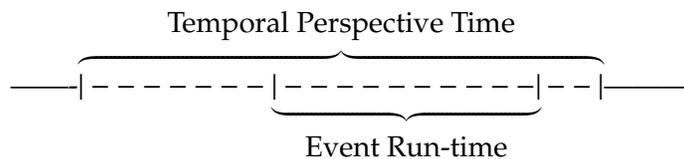
Gitksan, she points out, is a language where prospective aspect is overt and obligatory with circumstantial modals; this is why the actuality entailments always disappear (i.e., we have no actuality entailments). Matthewson further argues that *St'át'imcets* (Lillooet Salish) is an example of a language with a covert obligatory prospective aspect; like Gitksan, actuality entailments never arise, but there is no overt equivalent of *dim*. The final type of language that Matthewson refers to is Blackfoot. As we will see in chapter 7, Blackfoot has been described such that its ability attributions uniformly have actuality entailments, unless they are marked with *áak*- "will." Matthewson proposes that *áak*- is an overt, but optional, prospective aspect, following Reis Silva (2009b). I will argue that this cannot be the case for Blackfoot. First, I will argue in chapter 5, based on data from conditionals, that while Blackfoot does have prospective aspect, it is null.

Second, I will provide data in chapters 4 and 6 showing that *áak-* cannot be a simple prospective aspect because *áak-*-claims with stative (or stativized) prejacent can be interpreted as claims with a present, as well as future, temporal interpretation.⁹⁰ I offer an alternate analysis for Blackfoot's actuality entailments in chapter 7.

3.3.2 Ability Attributions and the STIT Approach

Kratzer (2011) and Matthewson (2012) assume that ability attributions take prospective temporal orientations. One of the main claims that I make regarding Blackfoot's ability modal *ohkott-*, however, is that it does not take a prospective temporal orientation; rather *ohkott-* claims are always interpreted such that the runtime of the prejacent event is contained within the temporal perspective time. In other words, *ohkott-* claims necessarily take perfective containment temporal orientations, as illustrated below:

(168) Perfective Containment Temporal Orientation



This claim about *ohkott-*'s temporal orientation is (i) a crucial consequence of the analysis presented in chapter 4 and (ii) a key part in my analyses for conditional antecedents in chapter 5 and actuality entailments in chapter 7. In this section I provide a (very brief) overview of approaches to ability within the linguistic literature, and then discuss the framework on which I base my analysis for ability in chapter 4. The basic intuition behind the analysis in chapter 4 is that ability attributions are inherently agentive, and that an explicit truth-conditional semantics for agentivity derives *ohkott-*'s temporal properties. We will see that this intuition that ability attributions are inherently agentive is not uncommon in the literature. The particular formalization of agentivity, however, varies both in terms of the level of formalization, and implementation.

Ability within the Linguistic Literature

The most common approach to ability modals in the linguistic literature is the one presented by Hackl (1998), Hacquard (2006), and Kratzer (2011) whereby an ability modal is an existential circumstantial modal. An (unembedded) ability claim like "Jane can play Stairway to Heaven" is thus paraphraseable as "There is a world compatible with the facts in the actual world where

90. In particular, I will argue that *áak-* is a modal that encodes a present/coincident temporal orientation, and that the prospective interpretation is due to a null prospective aspect. Reis Silva (2009b)'s arguments that *áak-* is prospective aspect rely on contrasting it with an alternative analysis where *áak-* is analysed as a future tense. Showing that *áak-* is not deictic, she concludes that it cannot be a tense, and therefore must be an aspect. She does make a claim about its status as a modal, or discuss the non-prospective interpretations associated with stative prejacent.

Jane plays Stairway to Heaven.” Hackl (1998)’s approach to ability modals has more to say, however, about the intuition that ability attributions are inherently agentive. He proposes that ability attributions necessarily take an agentive/causative VoiceP as their complement (where he follows Kratzer (1996) in assuming that an agent is introduced via a functional head Voice or little *v*.) The semantic analysis of VoiceP that he presents, however, is in terms of the features [+cause] and [+intentional]; he does not provide an explicit analysis regarding the truth-conditional effect that the features [+cause] and [+intentional] have.⁹¹

The existential approach to ability modals is not the only approach to ability modals within the linguistic literature. Most native speakers would agree that the paraphrase “there is a world compatible with the facts in the actual world where she hits the bullseye” is too weak for the ability claim in (169). Given a multiplicity of possible worlds, there is a possible world compatible with the facts in context 1 where Solveiga, by fluke, hits the bullseye. However, a claim that “she can hit the bullseye” is not acceptable in such a context (unless the speaker is extremely optimistic). A claim like “she can hit the bullseye” requires a better-than-fluke chance, as provided by the facts in something like context 2.

(169) She can hit the bullseye.

Context 1: Solveiga has been given a long bow. She is healthy and has good eyesight, but she’s never used a long bow before and it’s unlikely she’ll hit the target, let alone hit the bullseye.

Context 2: Solveiga has trained with a long bow for years. She’s been training to hit the

91. I am assuming that an explicit truth-conditional analysis for features like [+cause] and [+intentional] is not only desirable, but also a necessary component for any semantic analysis. This assumption is not shared by all linguists, however. Some linguists might ask why this type of explicit analysis should be posited; why not adopt feature/category labels like [+cause] and [+intentional] and call it a day? First, I assume that at least some of the original motivation for the features is semantic in nature - i.e., [+cause] and [+agentive] are meant to account for observations regarding the conditions in which a predicate with these features can be used truthfully or felicitously. My view is that only an analysis that makes explicit reference to truth-values or discourse structures is fully accounting for the observations - i.e., only an analysis that makes reference to truth-values can fully account for truth-conditional contrasts and similarly, only analyses that make reference to discourse structures can fully account for contrasts in terms of whether an utterance is acceptable in particular discourse structures. Postulating features like [+cause] and [+agentive], while a necessary step in the semantic analysis, is a generalisation as opposed to a fully-worked out formal analysis. Another reason to posit an explicit semantic analysis is a reason common to explicit analyses in any field of scientific inquiry: specific formal analyses allow for specific formal predictions that can be tested. For example, in chapter 4, I propose specific truth-conditional denotations for agentive and cause operators and v_{STIT} and v_{CAUSE} respectively; these can be viewed as explicit analyses for the features [+agentive] and [+cause], as in the analysis proposed, v_{STIT} and v_{CAUSE} have no overt morphological correlate. The particular truth-conditions I propose involve restrictions on what the world has to look like temporally, in order for predicates modified by the operators to be true. This then makes predictions about the temporal contexts in which the operators can be used, which I investigate in chapters 5 and 7. An analysis that stops at positing the labels [+agentive] and [+cause] for features or functional heads would not be able make these sorts of predictions. If, however, the original motivation for the postulation of features is purely morphosyntactic - i.e., the observations that [+cause] and [+agentive] are meant to account for are observations purely regarding the morphosyntactic position or form in which a predicate with these features can be used, then an explicit use/truth-conditional analysis for these features would be superfluous (or trivial in the sense that these features would be use- and truth-conditionally vacuous.)

bullseye from this distance for the past few weeks, and she's been getting closer and closer.

Kratzer (2011)'s approach to ability attributions addresses this problem (although not overtly); while she maintains an analysis where ability modals are existential quantifiers over worlds, she proposes that they universally quantify over (argument) counterparts. The counterpart relation that she proposes is so strict that by asserting what an individual does in one world, one effectively asserts the same of worlds that have counterparts of that individual. The weakness of the existential-quantification-over-worlds is thus strengthened by the universal quantification over (strict) counterparts.

Other researchers have addressed this issue of an ability modal's seemingly stronger-than-existential strength directly, proposing analyses of ability modals as universal quantifiers over worlds. For instance, Xie (2012) and Giannakidou & Staraki (2010) (influenced by the philosophical approach presented in Thomason (2005)) both present analyses of ability attributions, where the modal universally quantifies over circumstantially-accessible worlds. The modal's domain of quantification is restricted, however, in terms of the subject's agency - i.e., all of the worlds considered are ones where the agent chooses (a rational method) to bring about the prejacent proposition. This additional restriction allows for an analysis of ability modals as strong/universal quantifiers over worlds, while still accounting for the intuition that ability modals are weaker than modals like *will* and *must*. Giannakidou & Staraki (2010) take Copley & Harley (2011)'s force-framework and Baglioni (2010)'s notion of 'necessary means' to formalize the intuitive notion of agency. Copley & Harley (2011)'s framework, however, is deterministic; uncertainty about the future is formalized in terms of epistemic uncertainty. Different future outcomes can be referred to in language, but these different outcomes are derived from a speaker's unawareness regarding (i) the properties of an initial state and (ii) the magnitude and number of relevant forces acting on that initial state. An analysis situated in this sort of deterministic framework thus cannot quite incorporate the intuition that an ability attribution is an assertion of truth that is conditional on the agent's choices and intentions (i.e., free will) as well as causation. Xie (2012)'s analysis incorporates exactly this sort of intuition - he incorporates agency via a BDI (Belief-Desire-Intention) model (used within the AI literature). The BDI system he incorporates has its roots in Segerberg (1989)'s "bringing-it-about" approach, which is within the same general framework as the STIT "see-to-it-that" approach that I adopt. Because I will be discussing the STIT framework in some detail, I will not discuss the details of Xie (2012)'s BDI system (please see Xie (2012) for information on BDI systems).

The two final approaches to ability I discuss here (Brown (1988) and Horty (2001)) are from the logical/philosophical literature, although Portner (2009), discusses these two approaches in his section on dynamic modality. These approaches are highly influential for the analysis of ability that I present in chapter 4. Brown (1988), like Xie (2012) and Giannakidou & Staraki (2010), proposes that ability is a universal quantifier over worlds. And as is the case for Xie (2012) and

Giannakidou & Staraki (2010), the worlds Brown (1988) considers are restricted. He introduces this restriction with a layer of existential quantification over actions. Thus an ability attribution is paraphraseable as "There is an action available to the agent, α , such that all worlds compatible with α taking that action, are worlds where P obtains." The intuition is that an action is something that the agent can choose to do, hence incorporating the intuition that ability attributions require volition on the part of the agent. Brown's notion of an 'action' is formalized as a "cluster" of worlds. In this way, his notion of 'action' is very similar to the notion of 'possible choice' that Belnap & Perloff (1988) and Horty & Belnap (1995) use to define their STIT operator. STIT theories are all based on a branching-time framework (cf. Prior (1957, 2003, 1967), Thomason (1970), McCall (1984), Belnap (1992)). Because the STIT operator is a crucial part of Horty (2001)'s analysis of ability attributions, and because the definition of the STIT operator relies on more aspects of a branching-time framework than the previous discussions of Condoravdi (2002) and Copley (2002, 2009), I will provide a more detailed discussion of the branching-time frameworks that Belnap (1992) and Belnap & Perloff (1988) adopt. I will then describe the truth-conditions of two kinds of STIT operators: the achievement operator *astit* and deliberative operator *dstit*.⁹²

Branching Time Frameworks

Basic truth-functional semantic frameworks assume a domain of entities, **D**, along with a domain of truth-values **{1,0}**, where 1 indicates 'true', and 0 indicates 'false'. A semantic framework that takes into account the temporal sensitivity of truth - i.e., the observation that a claim may be true at a particular time/moment, but not true at other times/moments - will also assume the existence of a domain of times. Following Belnap (1992) and Belnap & Perloff (1988)'s terminology, I will refer to this as the domain of *moments*, **I**, where moments within the domain **I** are ordered by a precedence relation, $<$.⁹³ This forms a linear structure, as in (170): assuming that moments **m₁**, **m₂**, **m₃**, **m₄**, **m₅** are ordered such that **m₁** $<$ **m₂** $<$ **m₃** $<$ **m₄** $<$ **m₅**, we derive the following structure, where each moment is represented as a point in the line, and the arrow \rightarrow points towards the future, representing the forward nature of time.

(170) Linear Time



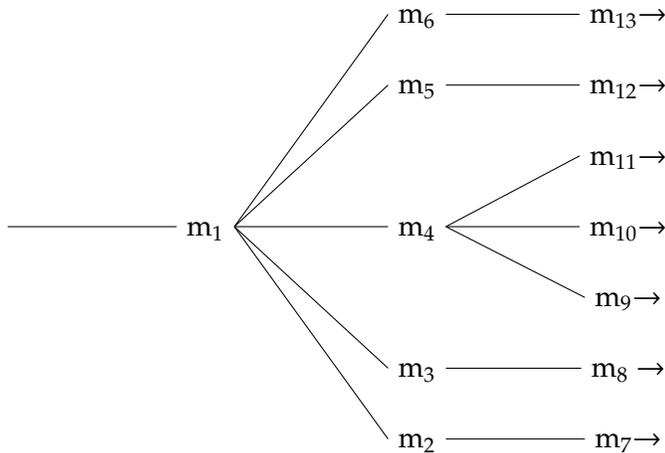
The sort of structure above represents a deterministic view - i.e., the past and the future are symmetrical. A branching time framework, on the other hand, assumes a non-deterministic (or indeterminist) view - i.e., these frameworks assume that the past and the future are fundamentally

92. The literature that I review here uses italicized lowercase letters *stit* for the 'see-to-it-that' acronym. Because I am already using italicized lowercase letters to refer to object-language elements (i.e., particular lexical items of Blackfoot and English), I am using allcaps STIT as an adjective to refer to the 'see-to-it-that' framework. When referring to the operators that Belnap (1992) and Belnap & Perloff (1988) propose, however, I revert to their original notation - i.e., *stit* for a STIT-type operator in general, *astit* for Belnap (1992)'s achievement STIT operator and *dstit* for Belnap & Perloff (1988)'s deliberative STIT operator.

93. More accurately, I follow Belnap & Perloff (1988) in the use of the term **MOMENT**; they refer to the set of moments as **TREE**. I also follow Belnap (1992) and Belnap & Perloff (1988) in formalizing moments as primitives.

asymmetric in that while the future is undecided and unsettled, the past is not. This asymmetry can be represented with a branching-time tree structure as below, where moments (again represented as points, but with particular moments labelled for convenience) are only partially ordered by the precedence relation, $<$, and the arrows again point towards the future. In the structure given, while $\mathbf{m}_1 < \mathbf{m}_4 < \mathbf{m}_9$, the moments \mathbf{m}_2 and \mathbf{m}_3 do not stand in the precedence relation with respect to each other. Nor do \mathbf{m}_4 and \mathbf{m}_5 , \mathbf{m}_2 and \mathbf{m}_5 , \mathbf{m}_3 and \mathbf{m}_5 , etc.

(171) Branching Time



Each horizontal path of the tree from beginning to end (left to right) corresponds to a **HISTORY** (which is, for our purposes here, equivalent to a **WORLD**); note that a single moment may be a member of several histories. For example, the moments \mathbf{m}_1 , \mathbf{m}_4 , and \mathbf{m}_{10} (ordered $\mathbf{m}_1 < \mathbf{m}_4 < \mathbf{m}_{10}$) are all contained within a single history. The moments \mathbf{m}_1 , \mathbf{m}_5 , and \mathbf{m}_{12} (ordered $\mathbf{m}_1 < \mathbf{m}_5 < \mathbf{m}_{12}$) are contained within a different history. Every vertical cross-section of the tree (i.e., the set of moments that are vertically aligned or co-instantial) is an **INSTANT**; note that each instant intersects each history at a single moment and each moment belongs to a single, unique instant. For example, \mathbf{m}_2 , \mathbf{m}_3 , \mathbf{m}_4 , \mathbf{m}_5 and \mathbf{m}_6 are all co-instantial, and thus contained within the same instant. ^{94,95} Belnap (1991) proposes that instants are subject to the following two conditions:

(172) Belnap (1991)'s Conditions on Instants

- a. Each instant intersects each history in a unique moment. Let $\mathbf{m}_{(i,h)}$ be the moment in which instant i cuts across (intersects with) history h .

94. Belnap (1991), Belnap (1992), Belnap & Perloff (1988) orient their trees as branching upwards, as opposed to rightwards as I have done. Thus they present histories as being vertical, and instants as being horizontal, in contrast to how I have presented histories as being horizontal and instants as being vertical. I have changed the orientation of the trees as rightward branching trees appear to be the norm in the linguistic literature on branching futures.

95. Hotze Rullmann suggested that one could avoid formalizing moments as primitives by defining instants as primitives, and moments as world-instant pairs. I personally find the conceptualization of moments as primitives quite intuitive, however.

- b. Instants never distort historical order: given two distinct instants, i_1 and i_2 and two histories h and h' , if the moment at which i_1 intersects h is earlier than the moment at which i_2 intersects h , then the same relation holds between the moment at which i_1 intersects h' and the moment at which i_2 intersects h' . In symbols, $m_{(i_1,h)} < m_{(i_2,h)}$ implies $m_{(i_1,h')} < m_{(i_2,h')}$.

The theory of instants thus imposes an isomorphic temporal ordering on all histories. It also allows us to indirectly compare moments that are not ordered with respect to $<$. Although neither Belnap (1992) nor Belnap & Perloff (1988) clarify whether the moments like m_4 and m_{12} in (171) are ordered with respect to each other, Belnap (1991)'s more detailed formalization, suggests that such moments are not "comparable," where two moments are comparable if either $<$ or $>$ holds. Thus it appears that m_4 and m_{12} are not ordered with respect to $<$. The theory of instants, however, allows us to compare these moments. A linear order on instants can be defined such that $i_1 < i_2$ if $m_1 < m_2$ for some moment m_1 in i_1 and some moment m_2 in i_2 . Because $m_4 < m_{10}$, we can conclude that $i_1 = \{m_6, m_5, m_4, m_3, m_2\}$ precedes $i_2 = \{m_{13}, m_{12}, m_{11}, m_{10}, m_9, m_8, m_7\}$. The unique instants to which m_4 and m_{12} belong, then, can thus be ordered with respect to each other, even if the moments m_4 and m_{12} themselves are not comparable.

(173) Definitions

- a. **HISTORY** = a maximal set of linearly ordered (comparable) moments.
b. **INSTANT** = a maximal set of co-instantial moments.

This sort of branching-time framework is not only popular within the philosophical tradition (e.g., Prior (1957, 2003, 1967), Thomason (1970), McCall (1984), Belnap (1992)); we've seen that it is also popular within the linguistic literature. Mondadori (1978), Condoravdi (2002), Ippolito (2003), Abusch (1994, 2012) and Copley (2002, 2009) all assume a branching temporal framework as above for their approaches to circumstantial/metaphysical modality. The linguistic approaches do not, however, incorporate a semantics for agency like the STIT approach described below.⁹⁶ Thus although they have the means to encode the intuition that the future may unfold in several different

96. An exception is Copley (2002, 2009)'s notion of 'direction,' although she does not present this as an analysis of agentivity. Copley (2002, 2009)'s notion of 'direction' is somewhat similar to the semantics of what Horty (2001) refers to a "Chellas"-style STIT operator, *cstit*. This operator is based on Chellas (1968)'s Δ operator, which we will see to be insufficient for the agentivity data that I aim to account for in this dissertation. It does suffice, however, for Copley (2002, 2009)'s aims. For reference and comparison, I give Copley (2002, 2009)'s definition of 'direction' below.

(i) An entity d *directs* a proposition p in w at t iff:

$\forall w'$ d has the same abilities in w' as in w : [$\forall w''$ metaphysically accessible from w' at t and consistent with d 's commitments in w' at t : [$\forall w'''$ metaphysically accessible from w at t : [$\exists t' < t[p(w'')(t')]$] \leftrightarrow [$\exists t' < t[p(w''')(t')]$]]]]
(Copley (2009); Kindle Location 1237 of 5838: Copley (2002); p. 49)

Notice that Copley (2002, 2009)'s definition of 'direction' refers to 'abilities.' Because I aim to encode a notion of agency into the semantics of ability (under the assumption that agency is more basic than ability), as opposed to having a semantics for the agency that includes a notion of ability (whereby ability would be more basic than agency), I cannot adopt Copley (2002, 2009)'s definition of 'direction' as a semantics for agentivity without being circular.

ways, they do not have the means to encode the intuition that an agent's choices can affect the way the future may unfold. The logical frameworks for STIT operators build on a branching-time framework in order to be able to express this intuition.

Achievement STIT

Although the term **AGENT** is commonly used in the generative linguistic tradition, beyond the postulation of different kinds of little *vs* (e.g., Folli & Harley (2005)'s CAUS, DO and BECOME) and the postulation of abstract **AGENT** relations, there is no widespread formal semantic approach to agentivity.⁹⁷ The STIT approach that I adopt here is taken from the philosophical literature (cf. Chellas (1968), Belnap & Perloff (1988), Horty (1989), Belnap (1992) Horty & Belnap (1995), a.o.).⁹⁸

The STIT approach to agency is one where the concept of agency is encoded by a STIT operator, whose truth-conditions are defined in terms of an agent's prior or current **CHOICES**.⁹⁹ The core intuition behind these approaches is that "x is the agent of P" is paraphraseable as "x sees to it that P," and that in order for the latter paraphrase to hold true, the individual, x, makes some choice which non-vacuously guarantees the result state P. In order to formalize these intuitions, a STIT framework assumes, in addition to the domain of entities, **D**, the domain of truth-values **{0,1}**, the set of moments **I**, and partial ordering relation $<$, the following:

- (i) **A**, the set of agents (a subset of the domain of entities), and
- (iii) **Choice**, a function from agent-moment pairs, to that agent's **CHOICE-SET**, where a **CHOICE-SET** is a partition of the set of histories.

Let α be an agent. A member of α 's choice-set is a **POSSIBLE CHOICE** for α . We can illustrate this with a tree as follows.¹⁰⁰

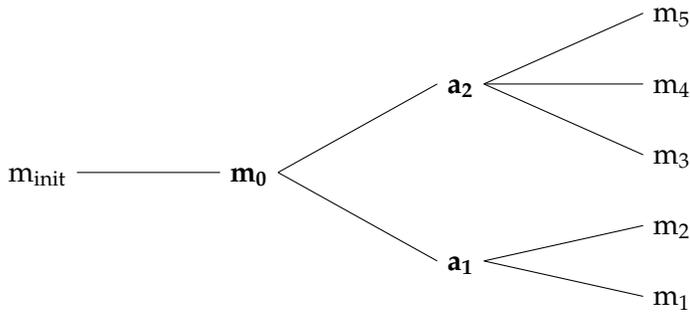
97. For instance, while Dowty (1979) posits lexical semantic denotations for CAUSE and BECOME operators, and posits a DO operator that is like CAUSE except that DO involves volition, he does not explicitly formalize a difference between DO and CAUSE. In chapter 4 I propose a semantic difference between my versions of DO and CAUSE, v_{stit} and v_{cause} respectively, in terms of the former making reference to actions, while the latter only refers to events.

98. These are not representative of all of the important works in the STIT literature - there are many more influential works that I do not reference because I have only begun to delve into the literature on the topic. Belnap (1992) provides a brief history of the STIT operator throughout the philosophical literature.

99. Whether the choice is prior or current differentiates the *astit* 'achievement sees-to-it-that' operator of Belnap & Perloff (1988) from the *dstit* 'deliberative sees-to-it-that' operator of von Kutschera (1998) and Horty & Belnap (1995).

100. My (lack of) facility with drawing diagrams in LaTeX has led to a somewhat misleading diagram in that \mathbf{m}_0 and \mathbf{a}_1 and \mathbf{a}_2 are not represented as being vertically aligned; this suggests that making a choice has an extent in time. In Belnap (1992) and Belnap & Perloff (1988), this is not the case, making a choice does not have temporal extent and \mathbf{a}_1 and \mathbf{a}_2 are represented as taking place at the moment \mathbf{m}_0 . Belnap (1992) and Belnap & Perloff (1988) pictorially represent this by representing \mathbf{m}_0 as a rectangular box as opposed to a node, where internal compartments of the box represent the difference choices one can make at \mathbf{m}_0 . The action-dependent approach that I present in chapter 4 replaces choices with actions, where actions *do* have an extent in time.

(174) Branching Time with Choices



Assume that $Choice_{\alpha}^{m_0} = \{a_1, a_2\}$ - i.e., at moment m_0 , α has two choices, a_1 and a_2 , which each correspond to a subset of the set of histories. If we assume a simplified model, where time starts at m_{init} and ends in the instant that contains m_1, m_2, m_3, m_4, m_5 as members, then a_1 corresponds to the subset containing the histories $\{m_{init}, m_0, m_1\}$ and $\{m_{init}, m_0, m_2\}$ as members, while a_2 corresponds to the subset containing $\{m_{init}, m_0, m_3\}$, $\{m_{init}, m_0, m_4\}$, and $\{m_{init}, m_0, m_5\}$ as members.

Another important concept we need to define in order to define the truth-conditions for the STIT operator is that of **CHOICE-EQUIVALENCE**. Two moments, m_n and m_m , are **CHOICE-EQUIVALENT** for α with respect to an earlier moment m_o if (i) m_n and m_m are members of the same instant, and (ii) m_n and m_m 's histories both pass through the same possible choice for α at m_o . The second condition represents the fact that no choice that α can make at m_o can distinguish between m_n and m_m . For example, in (174) m_1 and m_2 are choice-equivalent for α with respect to m_0 because α 's choices at m_0 , a_1 and a_2 cannot distinguish between them, since both moments pass through the same action (a_1). Since α cannot make his/her choice at m_0 in order to push the scales of how the future unfolds more towards m_1 than m_2 (or vice-versa), they are said to be choice-equivalent. Given the above framework and definitions, we can now define the truth-functions of an operator *stit* (this is the achievement stit, *astit*):

(175) Truth Conditions for *astit*

(Adapted from Belnap (1992))

$[\alpha \text{ astit} : Q]$ is true at m_0 just in case there is a prior "witness moment" m_w satisfying two conditions:

1. **Positive Condition:** Q must be true at all moments that are choice-equivalent to m_0 for α at m_w .
2. **Negative Condition:** There must be some moment, m_w (a "counter") that
 - (i) is in the instant i_{m_0} determined by m_0 ,
 - (ii) lies on a history through m_w and
 - (iii) is such that Q is *not* settled as true there.

The positive condition can be conceptualized as the requirement that the prior choice of α at \mathbf{m}_w “guarantees” that Q holds at the instant \mathbf{i}_{m_0} .

The negative condition can be conceptualized as the requirement that α 's choice at \mathbf{m}_w is *really* a choice with respect to Q - i.e., it's not the case that Q would have been guaranteed at \mathbf{i}_{m_0} independently of α 's choice at \mathbf{m}_w .

The *astit* operator thus sets up truth-conditions for “ α sees to it that Q” such that α at some previous point, made a choice that resulted in Q, where Q would not have been guaranteed otherwise. Notice that *astit*, as formulated, would not be paraphrased as “ x sees to it that P” - the *astit* operator is evaluated with respect to \mathbf{m}_0 , a moment co-instantial with the moments satisfying the positive condition. The formula $[\alpha \textit{astit} P]$ holds true at a point *after* the choice has been made, and after the result state, P, has been guaranteed. An $[\alpha \textit{astit} P]$ formula is thus better paraphrased as something like “ α saw to it that P.” In other words, the result state, P, at the evaluation time, is already a *fait accompli*. In the following section I discuss a variant STIT operator that situates the evaluation moment at the point where the agent's choice to either guarantee or not guarantee the result state P takes place. This variant, the *dstit* operator, better captures a sense of future, or potential agency.

Deliberative STIT

The truth-conditions of the ‘achievement operator *astit*’ discussed above refer to two separated moments: (1) the moment \mathbf{m}_0 (where the truth of Q is evaluated); and (2) the witness moment \mathbf{m}_w , where the choice (that guarantees the outcome Q) is made. The truth-conditions of the ‘deliberative operator’ *dstit* differ in that they only refer to a single moment - the witness moment where α makes the choice such that α sees to it that Q. The truth of Q is then evaluated with respect to the histories that run through the witness \mathbf{m}_w . This approach to the STIT operator was put forward by von Kutschera (1998) (prior to Belnap & Perloff (1988)), as well as in Horty (1989). Horty & Belnap (1995) introduce the following convenient notation: $\text{Choice}_\alpha^m(\mathbf{h})$ represents the particular possible choice within α 's choice-set at \mathbf{m} , that contains the history \mathbf{h} .¹⁰¹ They also define the function H, which maps from a moment, \mathbf{m} , to the set of histories containing that moment, $\mathbf{H}(\mathbf{m})$. The truth-conditions of the deliberative STIT can now be given as follows:

(176) The Deliberative STIT (Simplified from Horty & Belnap (1995))

$[\alpha \textit{dstit} : A]$ is true at \mathbf{m} , just in case:

1. **Positive Condition:** $\forall h' \in \text{Choice}_\alpha^m(\mathbf{h}), A$ is true.
2. **Negative Condition:** $\exists h'' \in \mathbf{H}(\mathbf{m})$ where A is not true.

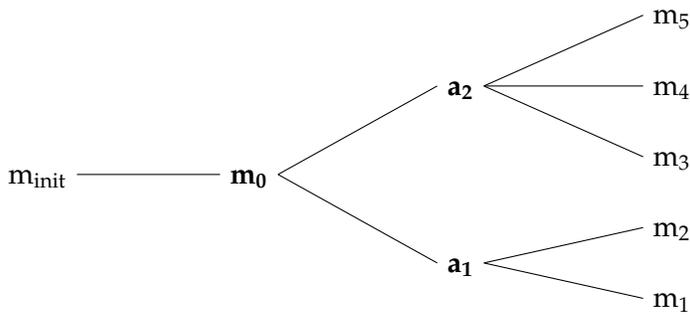
101. $\text{Choice}_\alpha^m(\mathbf{h})$ thus correlates to what the branching-time approaches like CTL and ATL call an **ACTION** (Emerson & Clarke (1982), Alur et al. (2002)) although those frameworks treat actions as ontological primitives.

The positive condition is the requirement that there is a choice available to α at \mathbf{m} such that that choice guarantees the truth of A (i.e., all of the histories contained in that choice are A-histories).

The negative condition is the requirement that α 's choice at \mathbf{m} is non-vacuous - i.e., A is not settled as true at \mathbf{m} (there is some history branching from \mathbf{m} where A does not hold).

The *dstit* operator thus sets up truth-conditions for " α sees to it that Q" such that the agent, α , is at a point (\mathbf{m}) where they can act in such a way to guarantee the truth of A (the positive condition), and that this choice is actually important, in that the truth of A is not guaranteed independently of that choice. The important point to take away from the comparison of the *dstit* and *astit* operators is their different temporal properties. While they both encode a modal semantics for agency, they differ in terms of their evaluation times: A proposition modified with an *astit* operator is evaluated with respect to the time at which the positive and negative condition are evaluated (i.e., the instant containing \mathbf{m}_1 , \mathbf{m}_2 , \mathbf{m}_3 , \mathbf{m}_4 , and \mathbf{m}_5 in the diagram below). A proposition modified with a *dstit* operator, in contrast, is evaluated with respect to the witness moment - i.e., with respect to \mathbf{m}_0 . Notice that, as was the case for the *astit* operator, an $[\alpha \textit{dstit} P]$ formula would not be paraphrased as " α sees to it that P." The evaluation moment, \mathbf{m} , marks the point where the agent's choice results in \mathbf{w}_0 's history being contained either in (i) a set of histories where P is guaranteed, or (ii) a set of histories where P is not guaranteed. Whatever events are set into motion by the individual's choice, the results of these events do not yet obtain at the evaluation moment. A better paraphrase might thus be "(upon making a certain choice) α will see to it that P." Thus while both operators (*astit* and *dstit*) capture the core intuition that agency involves non-vacuously guaranteeing some result state, P, by means of a specific choice, neither of them are really paraphraseable as " x sees to it that P." The important point to take away from this, however, is that agentivity can be defined in terms of an interaction between truth-values and times, but that the choice of which time serves as the evaluation time is arbitrary. We could thus posit the existence of another *stit* operator. This operator could take an interval as its evaluation time: the initial point of the interval correlating with the witness moment, and the final point correlating with the time at which the positive and negative condition are evaluated. This sort of operator could be paraphrased as " α sees to it that P," as per the use of the English simple present in book or chapter titles like "(In which) a Royal Wizard Catches a Cold." This sort of operator, in fact, is what I will propose for Blackfoot in chapter 4 - i.e., I will posit that Blackfoot's agentivity operator v_{stit} takes an interval as its evaluation time, where the initial point of the interval correlates with the witness moment, and the final point correlates with the time at which the positive and negative condition are evaluated. This agentivity operator figures in the analysis of the various modal-temporal interactions that we will see in chapters 4, 5, and 7.

(177) Branching Time with Choices



There are also variants of the STIT operator that vary in more than their temporal properties. For instance, Horty (2001) also defines the “Chellas” operator, *cstit*, based on the Δ operator from Chellas (1968). It is essentially the *dstit* operator without the negative condition (Chellas (1992), Horty & Belnap (1995)). Thus whereas the *dstit* and *astit* operator require that the truth of the complement A was not already settled, the *cstit*/ Δ operator does not. This is relevant for Horty (2001)’s analysis of ability attributions, to which I turn next.

Agentive-Embedding (STIT-selecting) Constructions

One of the goals of the STIT framework for agency is that it can account for constructions that embed agentive (‘action’) sentences. An ability attribution is one of these agentive-embedding constructions. In a STIT framework, ability attributions embed STIT sentences - i.e., the complement of an ability attribution must be equivalent to (or “strongly paraphraseable as”) its *astit*/*dstit*-modified counterpart (Belnap (1992)). Horty (2001) proposes that ability combines a possibility operator with a *cstit* complement, as shown below in (178b). Horty & Belnap (1995) propose the same, but with the *dstit* operator (178b).

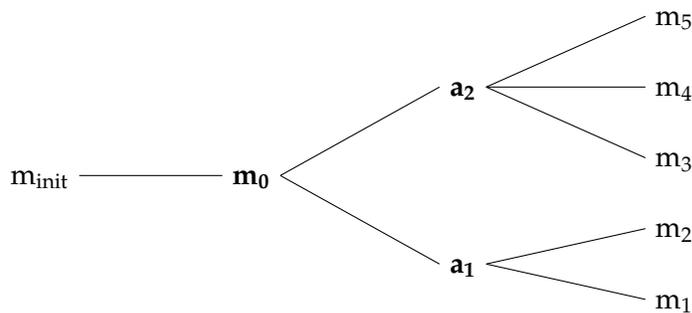
- (178) a. $\diamond [\alpha \text{ cstit } P]$ (Horty (2001))
b. $\diamond [\alpha \text{ dstit } P]$ (Horty & Belnap (1995))

Given that both STIT operators universally quantify over the histories/worlds that are choice-equivalent to the evaluation world, these approaches to ability combine an outer existential quantification and an inner universal quantification. Abstracting over the temporal differences between the STIT operators, they can be roughly paraphrased as follows: there exists an accessible world, w' , such that in w' , the agent α makes a choice such that (i) all of the worlds compatible with that choice are P-worlds, and (ii) at least one world not compatible with that choice is a not-P world. (178) are thus similar to the approach that Brown (1988) proposes for ability. Recall that Brown (1988) proposes that ability modals existentially quantify over the actions available to the agent and then universally quantify over the worlds compatible with those actions. The formalizations of ability in (178a,b) differ from Brown (1988) in that the existential and universal quantification

is not combined into a single operator *can*, but rather is decomposed into two different operators: the possibility operator \diamond and the (universal) STIT operator.¹⁰²

Kinds of STITs and Temporal Orientation

How do the STIT semantics described above interact with temporal orientation? Recall that the *astit* operator is evaluated with respect to the time at which the positive and negative condition are evaluated - i.e., $astit(P)(m_5)$ is true if there is a previous point (m_0), such that the choice leading to m_5 (a_2) results in all moments choice-equivalent to m_5 (i.e., m_5 , m_4 and m_3) being moments where P holds true (the positive condition), and and at least one of m_2 and m_1 are moments where P is false (the negative condition).



This means that the *astit* operator can only be interpreted with a past temporal orientation: if P holds true at m_5 , m_4 and m_3 , then the event that occurred in order for P to be true must have occurred prior to m_5 (as well as m_4 and m_3). An ability attribution taking an *astit* complement thus can only be interpreted with a past temporal orientation.

The *dstit* operator, on the other hand, is evaluated with respect to the time at which the choice is made. That is, given the same description as above, where P holds true at m_5 , m_4 and m_3 , and at least one of m_2 and m_1 is a moment where P does not hold true, $dstit(P)$ holds true at m_0 . This means that the *dstit* operator is only compatible with a prospective temporal orientation: if the evaluation time coincides with the time at which the choice (the partition of histories) branches off, then according to the negative condition, the prejacent property, P , cannot have been settled prior to that time. This means that the event that verifies the prejacent's truth in the positive condition must follow the choice/evaluation time. An ability attribution taking a *dstit* complement thus can only be interpreted with a prospective temporal orientation.

Note that neither of these temporal orientations need to be lexically encoded; given the ontological framework of branching times, the temporal orientations discussed are the only logical

102. Brown (1988)'s ability operator also varies from the combined operators in (178) in terms of what it operates over: the former existentially quantifies over actions and universally quantifies over worlds while the latter existentially quantifies over worlds and universally quantifies over histories. Because the actions that Brown (1988) quantifies over, however, correlate with a set of possible worlds, and because histories map 1:1 onto worlds, this variation does not result in any differences that are relevant for our purposes.

possibilities.¹⁰³ This will play an important role in the analysis for ability I present in chapter 4. The reader should note, however, that the particular formalization of a STIT operator that I present in chapter 4 is based on quantification over **ACTIONS**, as opposed to the quantification over **CHOICES** that Belnap (1992) and Horty & Belnap (1995) utilize. I use the CTL (Computation Tree Logic) and ATL (Alternating Time Logic) notion of an **ACTION** because actions are posited as primitives, as opposed to being defined as sets of histories. This allows me to simplify the denotations (i.e., I can refer to an action, **a**, in lieu of incorporating $\text{Choice}_a^{\text{tr}}(\mathbf{h})$ into my denotations) and also allows me to intuitively make reference to the instantiation of an action, and more crucially, the runtime of that instantiation. It is far less intuitive to talk about the instantiation of a set of histories, or its correlating runtime.

This chapter is a review of literature that focuses on the interactions between temporality and modality. In this section I have presented a review of various approaches to ability in the linguistic and philosophical literature. Importantly, we saw that a proper characterization of ability involves a semantics for agentivity, where agentivity was crucially formalized in modal-temporal terms. The final topic on the interaction between modality and temporality that I address in this chapter is the imperfective.

3.3.3 Imperfective Aspect and Deo (2009)

In chapter 2, I discussed Dunham (2008)'s Bonomi-style approach to the Blackfoot imperfective, and later provided a Deo (2009)-inspired denotation for the Blackfoot imperfective. However I abstracted away from (i) the (temporal) ways that the Deo (2009)-inspired approach differs from the Bonomi-style approach, and (ii) the general consensus that imperfectives crosslinguistically require a modal semantics. In this section, I discuss both of these issues in order to anticipate the action-dependent semantics I propose for the Blackfoot imperfective in chapter 4. I begin with a discussion of Portner (1998)'s modal approach to the English progressive, and then discuss Deo (2009), who incorporates both a Bonomi (1997)-style approach to the in-progress/habitual ambiguity, as well as incorporating a modal semantics.

The general consensus that imperfectives crosslinguistically require a modal semantics has to do with what is termed "the imperfective paradox" (Dowty (1979), Parsons (1990), Landman (1992), Zucchi (1999)). The imperfective paradox refers to the phenomenon whereby imperfective-marked accomplishments do not entail the truth of their perfective counterparts. This can be illustrated with the following example from English: if a speaker truthfully uses the progressively-marked (imperfective) accomplishment 'climb a mountain,' we cannot conclude that the simple

103. The *cstit* operator, on the other hand, places no logical restriction on the relationship between its evaluation time and event instantiation time. An ability modal taking a *cstit* complement thus has no restriction on the temporal orientation that it can take. It is unclear to me why Horty (2001) chooses the *cstit* as the complement of ability. For the data that I want to account for in this dissertation, the negative condition is necessary, so I will only consider STIT operators with the negative condition.

past (perfective) claim necessarily holds.

- (179) Joanne is climbing a mountain.
Therefore Joanne climbed a mountain.

This contrasts with imperfective-marked activities, which do entail the truth of their perfective counterparts. Thus if a speaker truthfully uses the progressively-marked activity 'dance' in (180), we can conclude that the simple past claim necessarily holds.

- (180) Joanne is dancing.
Therefore Joanne danced (at least a little).

The "paradox" comes from the assumption that accomplishments like 'climb a mountain' crucially encode the endpoint of the event in their lexical semantics (the same way a noun like 'dog' would crucially encode four paws and a tail in its lexical semantics). Thus the function $\llbracket \text{climb a mountain} \rrbracket^{h,c}$ correlates with a set of mountain-climbing events that include their endpoint - i.e., *completed* mountain-climbing events.¹⁰⁴ Given that assumption, formalizing the initial imperfective claim (179) in terms of its truth-conditions is problematic. Intuitively, we want to assert the existence of *part of* a completed mountain-climbing event in w_0 . However, this is problematic because the imperfective claim can be truthfully uttered by a speaker (and truthfully maintained) in contexts where the mountain-climbing does not complete. Thus we cannot guarantee that there is a completed mountain-climbing event in w_0 to which the semantics can refer. Modal semantics, of course, offers a way out of this "paradox" - the completed mountain-climbing event (which the real-world event is a part of) is asserted to take place in possible worlds. Portner (1998), following Dowty (1979), proposes that the completed event is asserted to take place in all of the worlds yielded by a circumstantial modal base and inertial/non-interruption ordering source.

- (181) Portner (1998)'s Progressive

$\text{PROG}(\phi)$ is true at a pair of an interval and a world $\langle i, w \rangle$ iff there is an event e in w such that $\tau(e)=i$ and for all worlds w' in $\text{Best}(\text{Circ}, \text{NI}, e)$ there is an interval i' which includes i as a non-final subinterval, such that ϕ is true at $\langle i', w' \rangle$.¹⁰⁵

104. Some researchers, e.g., Parsons (1989), do not accept this assumption, and suggest that the denotation of accomplishments like 'climb a mountain' correlates with a set of completed and incomplete mountain-climbing events. With that assumption, making reference to an incomplete mountain-climbing event is not problematic, and the "paradox" does not arise (cf. Zucchi (1999)).

105. $\text{NI}(e)$ is "the set of propositions which assert that e does not get interrupted," (e.g., {Joanne doesn't get eaten by a bear, Joanne doesn't get lost, Joanne doesn't hurt her leg,...}) and $\text{Circ}(e)$ is "the set of circumstances relevant to whether e is completed." I assume that Best yields the set of worlds compatible with $\text{Circ}(e)$ and which satisfy most of the propositions in $\text{NI}(e)$.

Portner (1998), looking at the English progressive, is not concerned with the in-progress/habitual ambiguity.¹⁰⁶ As imperfectives cross-linguistically (including the Blackfoot imperfective) are both (i) subject to the imperfective paradox and (ii) ambiguous in the way discussed by Bonomi (1997), a hybrid approach would be preferable. This is what Deo (2009) provides.

Deo (2009) takes Bonomi (1997)-style approaches to the imperfective as her springboard. Although sympathetic to the imperfective-as-universal approach, she points out that such accounts fail to properly account for various empirical properties associated with imperfectives crosslinguistically. Recall that Bonomi (1997) roughly proposes that the imperfective universally quantifies over subintervals of the reference time, asserting that each of these subintervals overlaps with a P-situation.¹⁰⁷

A common observation about habitual readings, however, is that habitual readings allow for exceptions - i.e., the claim that "Ekaterin works on her garden on Tuesdays" is still true even if on some Tuesdays, she does not garden. Bonomi (1997) gets around this by proposing that the imperfective only quantifies over "relevant" subintervals of the evaluation time, and encodes this notion of "contextual relevance" as a predicate in the semantics of the imperfective. That is, he proposes a function, CONT, which takes an interval, and yields its "contextually relevant" subintervals. The imperfective thus takes the evaluation time, applies CONT to the evaluation time, and then universally quantifies over the yielded subintervals. Deo (2009) points out that the notion of "contextual relevance" is unclear, which allows for very weak habitual readings. For instance, CONT could plausibly take the evaluation time, and only yield a single interval which happens to be the only time Ekaterin gardened on a Tuesday (where she usually gardens on Fridays). Bonomi (1997)'s approach, as it is, would predict that "Ekaterin gardens on Tuesdays" would still be true. Deo (2009), on a related note, points out that the "contextually relevant" subintervals must be regular - i.e., in order to truthfully utter a habitual claim, there must be a *regular* occurrence of P-situations. This aspect of the imperfective is not encoded in Bonomi (1997)'s analysis.

The second problem that Deo (2009) points out is the one of interest here - i.e., the fact that Bonomi (1997)-style approaches do not have a modal/intensional component to account for the imperfective paradox. Deo (2009) also points out that habitual readings are associated with an expectation that the regular occurrence of P-situations will continue into the future. This also requires a component of modality/intensionality. Deo (2009)'s proposal aims to take a Bonomi

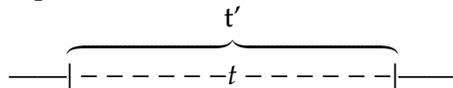
106. The literature states that progressives lack habitual readings. Given that, Portner (1998) has no reason to account for habitual readings. However, as noted in Dunham (2008) and Jóhannsdóttir (2011), the English progressive can nowadays be used with habitual readings.

107. Bonomi (1997)'s paper relies on the idea that aspects, like modals, come in universal-existential pairs. Thus, he proposes that the perfective and imperfective have nearly the same denotation, except that the perfective existentially quantifies over the RT's subintervals, while the imperfective universally quantifies over the RT's subintervals. This requires a fairly complex denotation for the imperfective which includes the postulation of a semantically null WHEN predicate. I have, and will continue to, abstract away from this issue as his insights into the imperfective do not rely on his proposed universal/existential pairing.

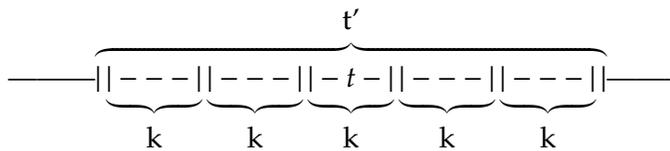
(1997)-style approach that avoids these problems. Deo (2009) proposes that the imperfective (universally) quantifies over a regular partition of (all of the) future-extended super-interval(s) of the evaluation time. I will first discuss the notion of a regular partition, and then discuss the requirement that the regular occurrence of P-situations must continue into the future. A regular partition of an interval is a division of that interval into subintervals that are (i) exhaustive, (ii) non-overlapping, and (iii) of equal measure/length. Each subinterval of the partition (each partition-member) is asserted to overlap with a P-situation.¹⁰⁸ A temporal schematic is provided below: First you take a superinterval, t' , of the evaluation time, t . Then you regularly partition t' into equal intervals of length k . The imperfective then asserts that each of these k -intervals overlaps with a P-eventuality.

(182) Universally quantifying over a regular partition

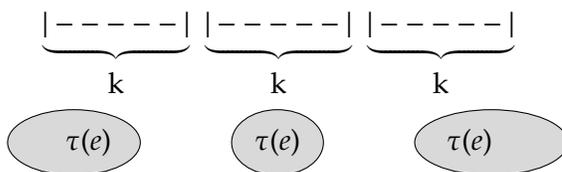
1. Take a superinterval, t' , of the evaluation time, t



2. Regularly partition t' into equal intervals, k .



3. Each of these k -intervals overlaps with a P-situation

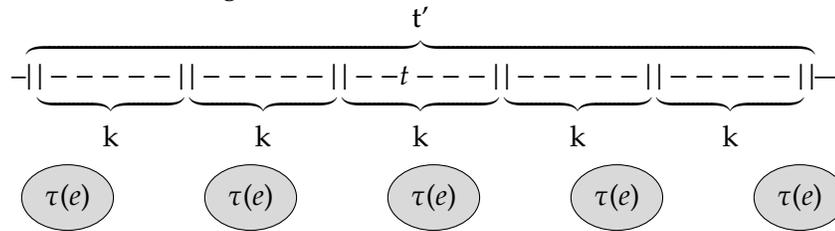


The size of the subintervals is determined by a partition-measure, which is contextually-supplied. The contextually-determined length of the sub-intervals is what yields the variation in

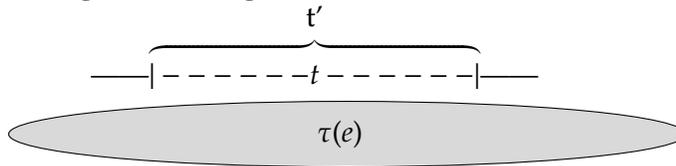
108. Technically, Deo (2009) proposes that each partition member coincides with a P-situation, where "coincidence" is encoded via a predicate COIN whose interpretation varies depending on whether it applies to a predicate of events, or a predicate of times. If it applies to a predicate of events, it correlates to the overlap relation \circ . If it applies to a predicate of times, COIN states that the predicate holds at the relevant subinterval. This is important for Deo (2009), as the imperfectives she looks at have a "continuous" reading with lexical statives (i.e., predicates of times). However, because the Blackfoot imperfective does not appear to have this distinct reading with lexical statives (the imperfective added to lexical statives results in a habitual reading, where we get an inceptive reading for each habitual occurrence), I abstract away from this technical issue.

reading between an in-progress and habitual reading. This part of the analysis is analogous to the Bonomi (1997)-style approach: if the partition measure specifies the length of the subintervals as long (compared to a normal length for which the predicate, P, holds), we derive the habitual reading. If the partition measure specifies the length of the subintervals as very short - i.e., the approaching the length of an instant,¹⁰⁹ then we derive the in-progress reading.¹¹⁰

(183) a. Habitual Reading



b. In-Progress Reading

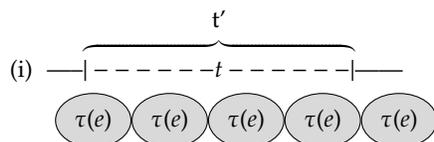


Deo (2009)'s postulation of a contextually-specified regular partition thus replaces Bonomi (1997) CONT function, with the added benefit that we can account for the intuition that the variously occurring P-situations are not completely free to contextual interpretation, but must occur regularly.

The second way that Deo (2009) differs from Bonomi (1997) is in terms of what is being (regularly) partitioned into subintervals. Bonomi (1997)'s analysis universally quantifies over the evaluation time. Deo (2009)'s analysis universally quantifies over future-extended superintervals of the evaluation time. Under the ontological framework that Deo (2009) adopts (and the onto-

109. Deo (2009) analyses the in-progress reading as following from an infinitesimally small partition measure. Because the particular ontology I am adopting is one where instants are points in time with no temporal extent, formalizing the intervals as instants is thus different from Deo (2009)'s notion of an infinitesimally small subinterval, which could plausibly have (a very small) temporal extent. This difference is not important for the purpose of the dissertation however.

110. Given the proposed semantics, the progressive reading should also be allowed in a context where each infinitesimally-small partition member overlaps with part of a series of unbroken P-situations, as per the diagram below. This seems to reflect my judgements for the English progressive, as the progressive form "Meagan is reading" is felicitous in a context where, stressed out from writing my dissertation, I binge-read novels back-to-back.



logical framework used here), reference to the future involves modality/intensionality. Deo (2009) does this with a branching-times framework, embedding the existential quantification of the superinterval under a universal quantifier over *histories*, where histories (as we saw in the previous section on branching times) are complete timeline intervals for worlds.¹¹¹ The reference/evaluation time, t , is used to generate the set of (inertially-ordered)¹¹² histories - i.e., those histories identical to w_0 up until the end of the reference/evaluation time. For our purposes, this is equivalent to the set of metaphysically accessible worlds at the reference/evaluation time. To maintain consistency with how modality is formalized in the rest of the dissertation, then, I also provide a denotation which translates Deo (2009)'s quantification over histories in terms of quantification over worlds. The introduction of the quantifier over worlds allows for the modal nature of the imperfective: for the in-progress reading, it accounts for the imperfective paradox, as the completed P-events are only asserted to occur in these future-extended worlds. For the habitual reading, the introduction of branching worlds accounts for the fact that the regular distribution of P-events is expected to continue beyond the evaluation time.

(184) a. Deo (2009)'s Imperfective Denotation:¹¹³

$$\llbracket \text{IMPF} \rrbracket^{h,c} = \lambda P. \lambda i. \forall h [h \in H_{i\text{-INR}} \rightarrow \exists j [i \subset_{\text{nf}} j \subset h \& \forall k [k \in \mathcal{R}_j^C \rightarrow \text{COIN}(P, k, h)]]]$$

\mathcal{R}_j^C is a function which takes an interval (j) and completely partitions it into regular subintervals, k , of a contextually determined length C .

$t \subset_{\text{int}} t'$ indicates that t is a subset of t' , but an *interior* subset - i.e., t does not contain the initial or final bound of t' .

b. Re-Framed Version of Deo (2009)'s Imperfective:

$$\llbracket \text{IMPF} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda w. \exists t' [t \subset_{\text{int}} t' \& \forall k \in \mathcal{RP}_t^C [\forall w' [w' \in \text{MAX}_G(\cap f(w)) \rightarrow \exists t'' [P(t'')(w') \& t'' \circ k]]]]]$$

\mathcal{RP}_t^C is the 'regular partition' function: a function which takes an interval (t') and completely partitions it into regular subintervals, k , of a contextually determined length, C .

The reader should be aware that the re-framed denotation also differs from Deo (2009)'s in terms of the relative scope of the quantifiers. While Deo (2009)'s denotation embeds the temporal quantifier under the modal quantifier, the reframed denotation I've provided embeds the modal quantifier not only under the existential temporal quantifier, but also under the universal quantifier

111. As far as I can tell, histories differ from worlds only in that (i) histories have the same semantic type as times (type i), and worlds do not (type s), and (ii) whereas people talk about individuals and events as standing in the part-of relation to worlds, individuals and events do not stand in the part-of relation to histories.

112. We can think of the function H_{INR} as a function that takes the reference interval, t , and generates the set of full histories compatible with t , ranks these histories according to those that follow the "normal course of events," and then outputs the highest-ranked histories.

113. H_{INR} refers to the "inertia histories" of the reference time variable, i . This takes the place of an inertial/stereotypical ordering source.

over partition intervals. This is to anticipate the observed interaction between habitual readings of the imperfective and causally-interpreted conditional antecedents, which will be discussed in chapter 5.

3.4 Summary

This dissertation focuses on three kinds of modal elements in Blackfoot: the future modals *áak-* and *aahkama'p-*, the ability modal *ohkott-*, and the imperfective aspect *á-*. It looks in particular at various temporal restrictions on these modal constructions. As such, in this chapter I presented a literature review covering (i) the Kratzerian framework for modals and conditionals, (ii) interactions between modals and temporality, including Condoravdi's seminal work, and (iii) relevant approaches to future modality (e.g., Copley (2002, 2009)), ability attributions (Brown (1988), Horty & Belnap (1995)) and imperfectives (Deo (2009)). In the next chapter, I discuss how these phenomena manifest in Blackfoot.

Chapter 4

Action-Determined Temporal Perspectives in Blackfoot

His mother had often said, When you choose an action, you choose the consequences of that action. She had emphasized the corollary of this axiom even more vehemently: when you desired a consequence you had damned well better take the action that would create it.

Excerpt from *Memory*,
by Lois McMaster Bujold

4.1 Introduction

In this chapter, I show that Blackfoot circumstantial modals fall into two categories with respect to the range of temporal perspectives they allow.¹¹⁴ The modals *áak-* "will" and *aahkama'p-* "might" allow either a past or present temporal perspective while the ability modal *ohkott-* only allows a past temporal perspective.

This is interesting because it parallels the observation that Reis Silva & Matthewson (2008) make for the tense interpretations of non-modal claims. Reis Silva & Matthewson (2008) observe that unmarked stative predicates in Blackfoot are compatible with either past or present temporal interpretations, while unmarked eventives are only compatible with past temporal interpretations. Following Bennett & Partee (1978), they propose that the Blackfoot tense patterns can be accounted for with two assumptions. First, that eventives are inherently dynamic - i.e., they involve some change over time and therefore have non-trivial (non-instantaneous) temporal extents. And second, that Blackfoot's present tense is instantaneous. Because eventives are crucially non-instantaneous, but Blackfoot's present tense is instantaneous, the two are incompatible.

In order to account for my observation, I will propose that Blackfoot's ability modal is eventive and hence, inherently dynamic. I will then argue that this dynamicity can be derived from an agentivity requirement. The framework I use is a combination of an action-dependent framework

114. The majority of the data and analysis presented in this chapter was presented in Louie (2014).

for circumstantial modality, and the ‘see-to-it-that’ (STIT) framework for agency.

This chapter is organised as follows. In the remainder of section 4.1 I present the data. In section 4.2 I outline the action-dependent theoretical framework for agency and circumstantial modality. In section 4.3 I show how this can account for the data generalisations from 4.2. In section 4.4 I discuss benefits of the action-dependent framework. Section 4.5 discusses how the action-dependent framework presented here can be paralleled in the epistemic domain, and section 4.6 concludes.

4.1.1 The Data: Tense and the Stative/Eventive Distinction

Reis Silva & Matthewson (2008) make the observation that the tense patterns in Blackfoot divide predicates into two types: bare stative predicates like *isttso’kini* ‘‘hungry’’ can be interpreted as either present or past, as shown in (185).

- (185) *Anna Mai’stoo isttso’kini*
 ann-wa Mai’stoo-wa **isttso’kini-wa**
 DEM-3 Raven-3 **hungry.VAI-3**
 ‘Mai’stoo is hungry.’ OR ‘Mai’stoo was hungry.’

Bare eventive predicates like *ihpiyi* ‘‘dance’’, on the other hand, are only compatible with a past interpretation. This is shown in (186).

- (186) *Anna Mai’stoo ihpiyi*
 ann-wa Mai’stoo-wa **ihpiyi-wa**
 DEM-3 Raven-3 **dance.VAI-3**
 ‘Mai’stoo danced.’ ≠ ‘Mai’stoo is dancing’

In order to get a present tense reading, the eventive must be marked with the imperfective *á-*. The imperfective appears to have a stativizing effect, as the imperfective-marked eventive is compatible with both past and present tense interpretations. This is shown in (187).

- (187) *Anna Mai’stoo áihpiyi*
 ann-wa Mai’stoo-wa **á-ihpiyi-wa**
 DEM-3 Raven-3 **IMPF-dance.VAI-3**
 ‘Mai’stoo is dancing.’ OR ‘Mai’stoo was dancing.’

The observation that I make is that circumstantial modals pattern in a similar way. Before presenting the data, however, a brief review of the temporal relations relevant for a modal claim will be useful. I assume a framework for temporality where there are three times of interest: First, the **UTTERANCE/SPEECH TIME**. Second, the **TEMPORAL PERSPECTIVE TIME**, which is the time for which

the propositions in the modal base hold true, or, the time that the speaker is basing their modal claim on; if the claim is based on past facts, the temporal perspective time is past, if the claim is based on present facts, the temporal perspective time is present.¹¹⁵ Third, the **EVENT TIME**, which is the runtime of the modal event - i.e., the event that is asserted to occur in some possible world.

(188) **Temporal Components of a modal claim**

1. Utterance Time (t_0)
2. Temporal Perspective Time (t_{mod})
3. Event Time ($\tau(e)$)

The notion of **TEMPORAL PERSPECTIVE** was introduced by Condoravdi (2002), who also introduces the term **TEMPORAL ORIENTATION**. Temporal orientation is the relationship between the temporal perspective time and the event time.

The observation that I make regarding Blackfoot’s circumstantial modals involves their temporal perspective - i.e., whether they can be based on present facts, or past facts. The data in (189) shows that an *áak*- claim can be interpreted as being based on present facts (189a). (189b) shows that an *aahkama’p*- claim can similarly be interpreted as being based on present facts.

- (189) a. **Context:** We’re planning to take the train to Whistler, and I’m checking the train schedules, because it doesn’t leave every day. I see that it leaves tomorrow, and tell you: The train leaves tomorrow.

áakomatapoo *apinákosi*
áak-omatap-oo apinákosi
FUT-begin.to-go.VAI tomorrow
 ‘It will leave tomorrow’

PRESENT

- b. **Context:** My neighbour was born with heart problems, and her mother worries about her over- exerting herself. Tomorrow is her prom, and her mom is really worried

aahkama’piksskai’ihpiyi
aahkama’p-iik-sska-ihpiyi
might-INTS-INTS-dance.VAI
 ‘She might dance a lot.’

PRESENT

115. The temporal perspective time is to a modally-modified claim what a **REFERENCE TIME** is to an aspectually-modified claim - i.e., the temporal perspective time is a new time argument introduced by the modal (just as the reference time is a new time argument introduced by aspect), and the time argument associated with the modal’s complement is asserted to hold some relationship to this time (just as the time argument associated with aspect’s complement is asserted to hold some relationship to the reference time.)

The data in (190) shows that *áak-* and *aahkama'p-* claims can also be based on past facts. (190a) shows this for an *áak-* claim and (190b) shows this for an *aahkama'p-* claim. Note, however, that the temporal perspective of *áak-* and *aahkama'p-* is, by default, present. In order to obtain past temporal perspectives with basic *áak-* and *aahkama'p-* claims, a past-interpreted conditional antecedent (as in the examples below) is usually required.¹¹⁶ By 'basic' I refer to *áak-* and *aahkama'p-* claims with non-modal complements; *áak-* and *aahkama'p-* claims with a modal *ohkott-* "able to" complement can be interpreted with a past (or present) temporal perspective in the absence of a past-interpreted conditional antecedent. Although I am unsure as to why this is the case, the relevant observation for our purposes is that (whether a past-interpreted conditional antecedent is required or not) the modals *áak-* and *aahkama'p-* do not require additional imperfective marking in order to be interpreted with a present temporal perspective.

- (190) a. **Context:** My dad surprised my mom with a getaway weekend at a cottage. Because my mom is incurably nosy, and my dad is not the stealthiest person, we're discussing how lucky my dad was in pulling it off, because there are many ways my mom could have found out.

iisáámii'ihtopi omi iihtáipoyoo'p áakohkoissksinim
ii-saami-ohtopi om-yi iihtaipoyo'p áak-ohkoissksini-m-wa
 ic-look.at.VAI-UNR DEM-0 phone FUT-find.out.VTI-LOC:3-3

'If she had taken a look at the phone, she would have found out.'

PAST

- b. **Context:** Martina's hockey team was down a player, and they tried to get Heather in as a ringer, since she's a decent player, but Heather couldn't play, and they lost.

anna H ááwahkaawohtopi aahkama'pomo'tsaakiyaa
ann-wa H waawahkaa-ohtopi aahkama'p-omo'tsaaki-yi-aawa
 DEM-3 H play.VAI-UNR might-win.VAI-3pl-DTP

'If Heather had played, they might have won.'

PAST

116. Although I have not been able to obtain past temporal perspective interpretations of basic *áak-* predicates in the absence of past-interpreted conditional antecedents, Amelia Reis Silva (pc) reportedly has obtained such examples. I have also found an example of a basic *áak-* claim with a past temporal perspective in Josselin de Jong (1914)'s text "The boy who was left in an eagle's nest," which I have reproduced below (with an updated transcription):

- (i) **Context:** Two boys are plotting to steal eaglets from an eagle's nest. One of the boys has been lowered into the nest with a rope and is about to steal one of the eaglets.

ki miksima iná'ksimiksíma áitsapiyópiíwa oyííssowaayiwa ki áako'toyiíwa
 ki om-iksi-ma ina'ksiM-iksi-ma á-it-sap-ipoyi-wa o-oyííss-owaa-yi-wa ki áak-o'to-yii-wa
 and DEM-PL-stat be.small.VAI-PL-stat IMPF-RL-in-stand.VAI-3 3-nest-2pl-0? and FUT-take.VTA-3:3'-3
tokskammayi
ni'tokskaM-ayi
 one.VAI-DTP

'those young ones were standing in their nest. And he was about to take one of them.'

(Afterwards, the boy with the rope outside of the nest abandons the boy in the nest. So the boy in the nest never ends up taking one of the little eaglets. Instead he ends up being raised with the eaglets.)

The compatibility that *áak-* and *aahkama'p-* show with past and present temporal perspectives contrasts with the range of temporal perspectives available to the ability modal *ohkott-*. An unmarked ability attribution like (191) can only mean “He was able to dance,” and not “He is able to dance.”¹¹⁷

- (191) *ihkottsspiyi*
 ii-**ohkott**-ihpiyi-wa
 ic-**ABLE**-dance.VAI-3
 ‘He **was** able to dance.’ ≠ ‘He is able to dance.’

As with non-modal eventives, in order to get a present temporal perspective, the imperfective *á-* is required. These *á-* marked ability attributions can take either a present or past temporal perspective.

- (192) a. *áohkottsspiyi*
 á-**ohkott**-ihpiyi-wa
 IMPF-**ABLE**-dance.VAI-3
 ‘He **can/is** able to dance.’ PRESENT
- b. **Context:** Because my brother is so voracious in his appetite, he’s quite a bit heavier than when he was younger. This has affected his hobbies. “When he was young, he was able to dance (but now he’s too fat).”
- otáínaksstsitsi* *áohkottsspiyi*
 ot-á-inak-istsitsi á-**ohkott**-ihpiyi-wa
 3-IMPF-small-be.VAI IMPF-**ABLE**-dance.VAI-3
 ‘When he was small, he could dance.’ PAST

	PAST	PRESENT
<i>áak-P, aahkama'p-P</i>	✓	✓
<i>ohkott-P</i>		
-unmarked	✓	×
-imperfective	✓	✓

Table 4.1: Range of Temporal Perspectives

The main question I address is why this pattern, summarized in table 4.1, arises. Why can’t an ability attribution like (191) take a present temporal perspective? Is it a coincidence that the

117. I have not provided minimal context-utterance pairs showing where the unmarked ability attribution is infelicitous in contrast to the imperfective ability attribution because, as I will show in chapter 7, imperfective-marked ability attributions additionally require a previous verifying instance of an event of the type described by the modal’s complement. That is, in all cases where an imperfective-marked ability attribution is felicitous, the truth of a bare/perfective-marked ability attribution is entailed (and relevant). Thus I cannot get clear judgements of infelicity for an unmarked/perfective ability attribution in a context where an imperfective ability attribution will be felicitous, although my consultant usually comments that the unmarked ability attribution is “about a previous time,” or about the fact that “he’s done it before.” These comments suggest (as per the translations) that unmarked ability attributions always have a past temporal perspective.

patterns of temporal perspectives allowed parallel the patterns in tense interpretations allowed for non-modal claims as observed by Reis Silva & Matthewson (2008), as shown in Table 4.2?

P	PAST	PRESENT		PAST	PRESENT
P _{stative}	✓	✓	<i>áak</i> -P, <i>aahkama'p</i> -P	✓	✓
P _{eventive}			<i>ohkott</i> -P		
-unmarked	✓	×	-unmarked	✓	×
-imperfective	✓	✓	-imperfective	✓	✓

Table 4.2: Range of Tense and Temporal Perspectives: Eventive and Stative Categories

Before trying to answer these questions, however, I will point out an additional way in which *ohkott*- is empirically distinct from *áak*- and *aahkama'p*-.

4.1.2 The Agentivity Requirement

The ability modal *ohkott*- also contrasts with *áak*- “will” and *aahkama'p*- “might” in that it requires its complement to be agentive. This is shown in (193) where we see that both the imperfective and unmarked ability attribution are infelicitous with the non-agentive *sootaa* “rain” as their complement.

- (193) a. # *áohkottsootaa* b. # *iihkottsootaa*
 á-ohkott-sootaa-wa *ii-ohkott-sootaa-wa*
 IMPF-ABLE-rain.VAI-3 ic-ABLE-rain.VAI-3
 ‘It can/could rain.’ ‘It was able to rain.’

This contrasts with *áak*-, *aahkama'p*- and the imperfective, which have no restrictions on their complement, as shown below.

- (194) a. *áaksootaa* b. *aahkama'psootaa* c. *áísootaa*
 áak-sootaa-wa *aahkama'p-sootaa-wa* *á-sootaa-wa*
 FUT-rain.VAI-3 might-rain.VAI-3 impf-rain.VAI-3
 ‘It will rain.’ ‘It might rain.’ ‘It’s raining.’

It should be noted that it is indeed an agentivity, and not an animacy, humanity or sentience restriction on the subject of *ohkott*-’s complement. The data in (195) are provided in a context with an animate and human subject, but one that has little control over her own actions. The infelicity of the ability attribution in (195b), along with the consultant’s comment regarding the necessity for a conscious thought process and control for an ability attribution, suggest that agentivity is necessary for a felicitous ability attribution.

(195) **Context:** My niece, Kaia, is only about 2-weeks old, so she can't do much except sleep, cry, feed and poop. The last time I changed her diaper, I noticed that it wasn't just her diaper that was dirty, but that the small of her back seemed wet. Further investigation showed that it wasn't just the small of her back. She somehow managed to poop so that the poop exploded out of her diaper and got all the way up her back, to her neck, all over her clothes.

a. *anna issitsímaan itohkanoohkitsii'sstaa otsistotohsiistsi*
 ann-wa issitsimaan-wa it-ohkana-ohkit-i'staa-wa ot-istotohsi-istsi
 DEM-3 baby-3 rl-all-upon-defecate.VII-3 3-3-clothing-0PL

'The baby pooped all over her clothes.'

b. # *anna issitsímaan itohkottohkanoohkitsii'sstaa otsistotohsiistsi*
 ann-wa issitsimaan-wa it-**ohkott**-ohkana-ohkit-i'staa-wa ot-istotohsi-istsi
 DEM-3 baby-3 rl-**ABLE**-all-upon-defecate.VAI-3 3-clothing-0PL

'The baby was able to poop all over her clothing.'

BB: As if she can think about it and do it, but she can't. The baby doesn't have control.

This intuition is further evidenced by the data in (196). The example in (196a) shows that the non-agentive predicate *innisi* "fall" normally cannot be used as the complement of *ohkott*-. However, in a context where falling can be construed as a conscious desire/goal of the subject, it is acceptable, as shown in (196b).

(196) a. # *Anna Amelia iihkottsinnisi*
 ann-wa Amelia ii-**ohkott**-innisi-wa
 DEM-3 Amelia ic-**ABLE**-fall.VAI-3

Target: 'Amelia was able to fall.'

BB: You don't try to fall! No one wants to fall, you try not to fall.

b. *anna Apoyaakii iihkottsinnisi*
 ann-wa Apoyaakii-wa ii-**ohkott**-innisi-wa
 DEM-3 Apoyaakii-3 ic-**ABLE**-fall.VAI-3

'Apoyaaki was able to fall off.'

BB: Maybe it was running away with her. E.g., *nitohkottsinnisi* "I was able to fall off the horse," because you want to get away from the horse, it's taking off with you.

I suggest that these two ways in which *ohkott*- differs from the other circumstantial modals *áak*- and *aahkama'p*- are not a coincidence, and that *ohkott*'-s temporal/dynamic properties can be derived from the agentivity requirement observed above.

4.2 Theoretical Framework: Action-Dependency

The basic framework I'll be using is an action-dependent approach to agency and circumstantial modality inspired partly by Brown (1988) and branching-time temporal systems like CTL and

ATL¹¹⁸ (Emerson & Clarke (1982), Alur et al. (2002), a.o.). The basic intuition behind these approaches is that inferences about the way the world unfolds are based not only on an individual's circumstances, but also on the actions that an individual can take. And if this is the case, I suggest that the way we grammatically express these inferences should likewise make reference to actions.

Basic Intuition:

Inferences about the way the world unfolds are based on

1. an individual's circumstances, but also
2. the **ACTIONS** an individual can take

→ The way we grammatically express these inferences should make reference to **ACTIONS**

The issue of what counts as an action, and how actions interact with the causal chain of events, is a controversial topic in philosophy. Exactly what sequence of circumstances and events give rise to an action? Are parts of that sequence themselves part of the action, or do they constitute actions in and of themselves? These are all questions that Brand (1979) considers when he outlines various theories of actions. For our purposes, we can consider a causal chain of events as follows: First, an individual, **S**, has a certain state of knowledge, **D**, and a certain mental state (eg. desire), **B**. **D** and **B** give rise to a mental action, **MA**, that correlates to what we can identify as "willing" or an intention. The mental action, **MA**, an intention, then engenders a "bit of behaviour," **b**, on the part of the individual, **S**. This bit of behaviour is associated with the action, **a**. The question to consider is as follows: which parts of this sequence of causation are necessary, and which parts constitute what I mean by an "action"? Should the mental event of "willing" - i.e., the intention - along with the physical "bit of behaviour" make up the action? Or should the physical behaviour alone constitute what makes up an action? And if the mental events of "willing" are not considered part of an action, should we count them as separate actions in and of themselves?

The approach that I take here is in the spirit of what Brand (1979) identifies as the most commonly held view: the Causal Theory of Action. According to this theory, **D** and **B** cause the bit of behaviour identified with the action **a**. **D** and **B**, however, are not themselves (i) part of the action, nor (ii) constitute actions in and of themselves. Mental events like "willing" play no role in the causal chain. This contrasts with what Brand (1979) identifies as the Mental Action Theory, wherein mental actions like "willing" are crucial parts of the causal chain: it is the mental event **MA** that causes a bit of behaviour, **b**, and this bit of behaviour is associated with the action **a**.¹¹⁹

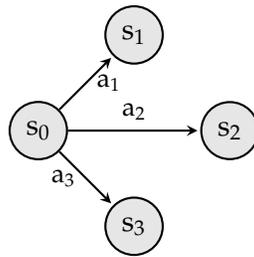
118. Computation Tree Logic (CTL) and Alternating-time Temporal Logic (ATL) are theoretical frameworks/logics used more often in computer science and philosophy.

119. As Brand (1979) describes it, according to the Mental Action Theory, the action itself plays no role in the causal chain. The "bit of behaviour" **b** is what interacts with the causal chain, and **b** only associated with, not identified as, the action **a**. This contrasts with the Causal Theory which Brand (1979) actually describes without direct reference to **b**; **D** and **B** directly cause **a**. This difference in description is due to Brand (1979)'s ontology: he specifically defines **b** as being "non-actional" behaviour. I have avoided this stipulation in order to abstract over this difference between

The mental action of "willing," **MA**, is a crucial definitional component of an action that interacts with the causal sequence of events. Brand (1979) provides several issues that have been raised against the Mental Action Theory. The first issue is that the Mental Action Theory is subject to an infinite regress. As Brand (1979) puts it, "[s]ince willings are actions, there must be a will to will, and so on *ad infinitum*. He provides two different ways to address this infinite regress problem. First, he suggests a stipulation whereby "willing to will" is identical to "willing," and hence the regress does not arise. Secondly, he suggests a stipulation whereby the mental action of "willing" is a special type of action that, unlike other actions, need not be willed. In any case, the mental action must be distinguished from the non-mental actions that are instantiated as bits of behaviour. The sort of actions that I consider relevant for my analysis are only physical actions that are instantiated by bits of behaviour. The intent, or "willing" that gives rise to these actions, while important, are not themselves part of the action, nor are they actions themselves on par with the kind of action I consider here. In what follows, I describe how I will incorporate this notion of action into a linguistic framework.

In CTL and ATL, actions are dynamic moves that an agent makes, to transition from one state to another. This is schematized in (197).

(197) State-changing Actions



Actions are posited as primitives in these system, and I will follow these approaches: I posit a domain of actions, **Act**, in the semantic ontology. I will assume that the actions in **Act** are mutually exclusive alternatives; the actions are individuated in a way so that an agent cannot take two actions at the same time.

- | | | |
|----------|-------------------------------------|--------------|
| (198) a. | $D_e = \{a, b, c, d, \dots\}$ | individuals |
| b. | $T = \{1, 0\}$ | truth-values |
| c. | $W = \{w_1, w_2, w_3, \dots\}$ | worlds |
| d. | $I = \{t_1, t_2, t_3, t_4, \dots\}$ | times |
| e. | $Act = \{a_1, a_2, a_3, \dots\}$ | actions |
| f. | $E = \{e_1, e_2, e_3, \dots\}$ | events |

the Causal and Mental Action Theory. The issue that I find relevant - i.e., whether or not mental events like intentions should count as part of an action, or as actions themselves - is independent of this technicality.

Linguistically, we can follow a suggestion that Chierchia (1998) makes, and think of actions as fulfilling a role similar to kinds; actions can be viewed as event-kinds. This means that just as kinds are instantiated by individuals, actions are instantiated by events - i.e., just as the individual, **b**, can be conceptualized as an instantiation of the wolf-kind **canis lupis**, an event, **e** can be conceptualized as an instantiation of an action **a**. Actions, like kinds, represent regularities between similar sorts of events the same way that kinds represent regularities between similar sorts of individuals. Just as a set of prototypical properties can be used to regulate the properties associated with the individual instantiations of a kind, an action (i.e., an agent's chosen procedure/conduct) can be used to regulate the properties associated with the instantiating events. The particular properties of an event or individual that are expressed in an instantiation of an action/kind depends on the circumstances in which the individual or action is instantiated. Thus an instantiation of the lion-kind **panthera leo** in the Serengeti may result in a male lion with a large mane that doesn't participate in hunting, an instantiation of the lion-kind **panthera leo** in the harsher environment near the Tsavo River may result in a male lion without a mane that will participate in hunting. Similarly, the resulting instantiation of an action can differ according to the circumstances of the initial state, s_0 . The same physical action taken by an agent in different circumstances may result in completely different events - e.g., in one initial situation, the action **a** may instantiate as a bubble-blowing event, whereas in another initial situation, taking the action **a** may instantiate as part of a cigarette-smoking event.

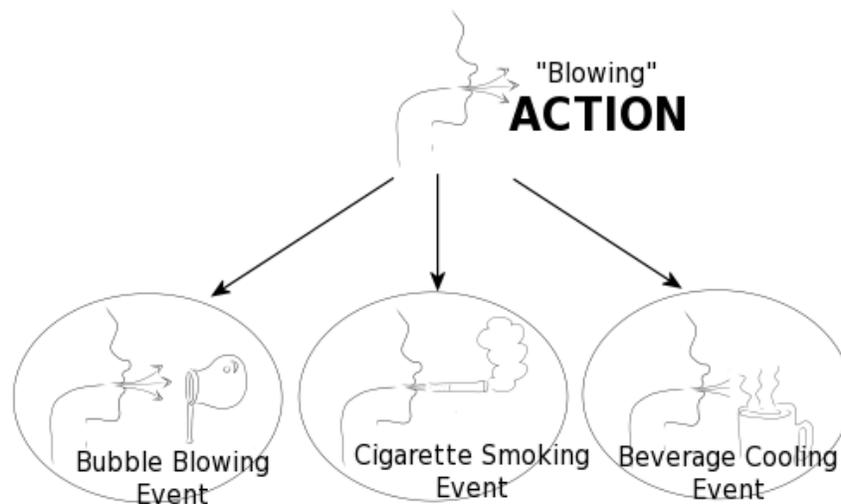


Figure 4.1: Actions and Events that Instantiate Actions

Note that not all events, however, are instantiations of actions. Actions crucially involve sentient individuals who purposefully make choices (even if the results of those actions are not what the individual intends). Events, on the other hand, need not include sentient individuals. Thus while all instantiations of actions are events, not all events are instantiations of actions;

events that are instantiations of actions form a subset of the total set of events. If one assumes that individuals are all instantiations of kinds (i.e., if one assumes that unique individuals are merely one-of-a-kinds, as opposed to individuals that don't belong to a kind), the parallel between individuals-and-kinds and events-and-actions breaks down here.¹²⁰ The underlying intuition behind the parallel is nonetheless a useful way to theoretically clothe actions so that they can be grounded in the sort of linguistic framework we are used to.

Taking this sort of kind-individual relation between actions and events, we can posit an instantiation relation, R as follows:

(199) The Action-Instantiation Relation, R ¹²¹

$R(a,x,w,t) \approx$ The agent x participates in the instantiation of the action a in w at t
(where t is the runtime of the event instantiating a)

I follow Brown (1988) in assuming the existence of the null action, a_0 . This is the special action which basically consists of taking no action - i.e., the action where the agent doesn't do anything to change the status quo.¹²² In cases where the initial state, s_0 , is **STABLE** (i.e., no change is in progress), nothing changes. In cases where s_0 is **NON-STABLE** (i.e., a change is already in progress), no incipient changes are averted. Finally, I will assume that the runtime of the events that instantiate the null action are negligible/instantaneous. This captures the intuition that taking the null action (i.e., doing nothing) does not require any extent in time.¹²³

4.2.1 A Modal Semantics for Agency

How can this framework formalize an agentivity requirement? The approach here is taken from Belnap (1992) and Belnap & Perloff (1988)'s STIT framework for modal agency, modified for an

120. I don't believe this lack of parallelism is problematic. I have presented this parallel between individuals-and-kinds and events-and-actions as a theoretical lens through which actions (unfamiliar to most linguists), may appear in a familiar light. I do not propose that a strict parallelism is mandated by the grammar, and indeed am unsure as to how such a mandate would be encoded.

121. This instantiation relation contrasts with a standard kind-individual instantiation relation, which directly relates the kind to the instantiation. In the interest of maintaining a parallel between the nominal and verbal domain, we could posit a more basic instantiation relation (call it τ , 'resh'), and then define R in terms of τ , as follows:

(i) The Action-Event Instantiation Relations, τ and R

$\tau(a,e)$ if the event, e , instantiates the action, a .

$R(a,x,w,t)$ iff $\exists e[\tau(a,e) \& \tau(e) = t \& e \leq w \& AG(x,e)$

As the particular phenomena I am dealing with require reference to the runtime, agent and world associated with an action's instantiation, the relation R is more useful for the formalisms than the basic instantiation relation τ . For this reason, I will continue to use R and leave the question of whether the grammar makes direct reference to τ as a question for further research.

122. In the action-dependent framework I'm proposing, this "null action" plays the role that an inertial ordering source does in other frameworks, e.g., dealing with the imperfective paradox.

123. Although, in my experience, an agent can repeatedly take the null action and waste quite a lot of time.

action-based framework.¹²⁴ The basic mechanism is the postulation of an agentivity operator, STIT, where the STIT operator applies to any predicate and yields a predicate with the following truth-conditions.

(200) **Basic Intuition: Agentivity Operator ‘STIT’**

“**x sees to it that P**”: There is an action such that

- (i) **Positive Condition:** All of the worlds compatible with x taking that action are P-worlds
- (ii) **Negative Condition:** There is a world w where x doesn’t take that action, which is a $\neg P$ world

Essentially, the agent, x, takes an action, a, which (non-vacuously) guarantees the truth of P. The result of the STIT operator applying to a predicate (whether or not that predicate is agentive), is agentive.

(201) **The Agentiveness of STIT Thesis:**

STIT(P) is agentive, whether or not P is agentive (cf. Belnap (1992))

The particular version of STIT I propose is given below.¹²⁵ In terms of the list of complex types presented in Table 2.11, chapter 2 (repeated as Table 4.3), the v_{stit} operator applies to a temporally-indeterminate property (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$), and yields a predicate (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$).

(202) $\llbracket v_{stit} \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathbf{Act}[R(a, x, w, t) \&$

- (i) $\forall w' [R(a, x, w', t) \rightarrow P(\mathit{fin}(t), x, w')] \&$ (Positive Condition)
- (ii) $\exists w'' [\neg R(a, x, w'', t) \& \neg P(\mathit{fin}(t), x, w'')]]$ (Negative Condition)

The v_{stit} operator that I propose differs from Belnap (1992)’s *astit* operator and Belnap & Perloff (1988)’s *dstit* operator in terms of its temporal argument. The temporal argument that v_{stit} takes correlates with the runtime of the event instantiating the action that v_{stit} quantifies over, and the positive and negative condition are asserted to hold true at the final point of that interval. In contrast, the temporal argument associated with Belnap (1992)’s *astit* operator correlates with the final point (i.e., the point at which you evaluate the positive and negative condition), and

124. The cited works quantify over x’s CHOICES (where a choice is formalized as a cell in a partition of W) as opposed to x’s actions. A choice can be viewed as the set of worlds where x instantiates the action a.

125. The particular formalization of the STIT operator uses a function, *fin*, which takes an interval and yields the final bound of that interval. As this function is only defined for closed intervals, the temporal argument of the STIT operator must be a closed interval in order to avoid undefinedness. We could avoid this problem by encoding an additional restriction onto the past tense t_{PAST} . This means that the variable that t_{PAST} ranges over, in addition to ranging only over times that precede t_0 , also only ranges over closed intervals.

Type	Interpretation	Technical Term	Examples in a Blackfoot Composition
$\langle l, \langle i, \langle e, \langle s, t \rangle \rangle \rangle \rangle$	A function from events to functions from times to functions from individuals to functions from worlds to truth-values	Predicate	The type of eventive verbs like <i>ihpiyi</i> “dance”
$\langle i, \langle e, \langle s, t \rangle \rangle \rangle$	Function from times to functions from individuals to functions from worlds to truth-values	Temporally-Indeterminate Property	The type of stative verbs like <i>istso'kini</i> “hungry”
$\langle e, \langle s, t \rangle \rangle$	Function from individuals to functions from worlds to truth-values	Property	What is yielded when tense applies to a temporally-indeterminate property like <i>istso'kini</i>
$\langle s, t \rangle$	Function from worlds to truth-values	Proposition	A Blackfoot sentence like <i>anna mai'stoo ihpiyi</i> “Mai'stoo danced.”

Table 4.3: Complex Types in Blackfoot: First Pass

the temporal argument associated with Belnap & Perloff (1988)'s *dstit* operator correlates with the initial point (the point at which the choice of which action to take is made). This difference is significant because in order for any $v_{stit}(P)$ (i.e., any agentive predicate created via the v_{stit} operator) to hold true of a time, \mathbf{t} , \mathbf{t} must be an interval. This follows from the following reasoning: Given the positive condition, P has to hold true (and hence be settled as true) at the final point of \mathbf{t} in all of the action-compatible worlds. Given the negative condition, P cannot be settled as true at the initial point of \mathbf{t} - because at that point, the agent must still be able to take an action that results in a world where P does not obtain at the final point of \mathbf{t} . This means that the initial and final point of v_{stit} 's temporal argument must be distinct, and hence the temporal argument must be a (non-trivial) interval. Given Reis Silva & Matthewson (2008)'s assumptions regarding the formalisation of tense in Blackfoot - i.e., that Blackfoot's PRESENT tense is instantaneous, while its PAST tense is an interval/non-instantaneous - any agentive predicate can only be interpreted with a non-present evaluation time. An example of an agentive verb stem in Blackfoot (the predicate *ihpiyi* “dance”) is given below in (203). The symbol \mathbf{P} represents the result state that is guaranteed by the agent's action; DANCE represents a subset of result states that hold true after dancing events.

$$(203) \quad \llbracket ihpiyi \rrbracket^{h,c} = \lambda e. \lambda t. \lambda x. \lambda w : \exists \mathbf{P} \in \text{DANCE}. [\tau(e) = t \ \& \ v_{stit}(\mathbf{P}, t, x, w)]$$

A note should be made regarding transitive predicates. For simplicity of exposition, to this point I have discussed how to formalize only intransitive predicates. In order to capture intransitive predicates, the previous formula for v_{stit} (repeated below) is sufficient:

$$(204) \quad \llbracket v_{stit} \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathbf{Act} [R(a, x, w, t) \ \&$$

- (i) $\forall w' [R(a, x, w', t) \rightarrow P(\text{fin}(t), x, w')] \&$ (Positive Condition)
(ii) $\exists w'' [\neg R(a, x, w'', t) \& \neg P(\text{fin}(t), x, w'')] \&$ (Negative Condition)

In order to capture the transitive nature predicates like *oowat*, *eat.vTA*, which involve interactions between distinct individuals, we can posit the following variation of v_{stit} :

- (205) $\llbracket v_{stit} \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle} . \lambda t . \lambda x . \lambda w . \exists y, \exists a \in \mathbf{Act} [y \leq x \& R(a, y, w, t) \&$
(i) $\forall w' [R(a, y, w', t) \rightarrow P(\text{fin}(t), x, w')] \&$ (Positive Condition)
(ii) $\exists w'' [\neg R(a, y, w'', t) \& \neg P(\text{fin}(t), x, w'')] \&$ (Negative Condition)

This is essentially the same denotation, but it attributes the action-component of eating to only a less-than-or-equal part of the (possibly sum) individual x . In cases where v_{stit} combines with an intransitive predicate like *ihpiyi*, this correlates to an equal part - i.e., $x = y$, and we derive the same meaning as the more simplified version of v_{stit} yielded. The modified v_{stit} combines with a transitive predicate like *oowat*- as in (206), where the v_{stit} component takes the sum of the verb's agent and theme arguments ($x \oplus y$) as its own argument.

- (206) $\llbracket oowat \rrbracket^{h,c} = \lambda e . \lambda t . \lambda x . \lambda y . \lambda w : \exists P \in \mathbf{EAT} . [\tau(e) = t \& v_{stit}(P, t, z, w) \& x \oplus y = z]$

As transitivity is not directly relevant for the data I aim to account for, however, for the rest of the dissertation, I will return to abstracting over the issue of transitivity and refer only to the simplified version of v_{stit} .

Before moving on to discuss incorporating the agentivity requirement into a modal claim, I will point out three things that are important to clarify. The first point to clarify is that although the analysis presented here can account for why agentive eventives have dynamic temporal properties, it cannot account for the dynamic temporal properties of non-agentive eventives (like *innisi* "fall"). I suggest that non-agentive eventives encode an operator very similar to v_{stit} , e.g., v_{cause} , as below, which similarly has a negative and positive condition (and hence the dynamic temporal properties of v_{stit}), but lacks reference to actions.

- (207) $\llbracket v_{\text{cause}} \rrbracket^{h,c} = \lambda P . \lambda t . \lambda x . \lambda w . \exists e [\tau(e) = t \& e \leq w \&$
(i) $\forall w' [e \leq w' \rightarrow P(\text{fin}(t), x, w',)] \&$ (Positive Condition)
(ii) $\exists w'' [e \not\leq w'' \& \neg P(\text{fin}(t), x, w'')] \&$ (Negative Condition)

(208) $[[innisi]]^{h,c} = \lambda e. \lambda t. \lambda x. \lambda w : \exists P \in \text{FALL}. [\tau(e) = t \ \& \ v_{\text{cause}}(P, t, x, w)]$

Whereas the agentive operator v_{stit} situates the positive condition in worlds where the agent takes a particular action, and situates the negative condition in worlds where the agent doesn't take that action, the denotation for the causative operator v_{cause} situates the positive condition in worlds where a particular event, e , occurs, and situates the negative condition in worlds where the particular event, e , does not occur. While this event may be an instantiation of one of the subject's actions, unlike the case of v_{stit} , it doesn't have to be. Consider, for example, the following context where the event that causes the subject to fall is not an action by the subject, but rather an action (bucking) by the cow that the subject is trying to ride.

(209) **Context:** Beatrice is telling a story about the time her older sisters convinced her to ride a cow.

<i>itomátapohkó'kakináapikssi.</i>	<i>ótokaani</i>	<i>nitsitahtááyim</i>
it-omatap-ohko'kakiniáapikssi-wa	ot-o'tokaan-yi	nit-it-waahtaayi'maa
rl-start-buck.VAI-3	3-head-3'	1-RL-grasp.VAI
<i>ninááhkaanistsitohkitopii</i>	<i>nisóissksinitaksiistsi</i>	<i>nitsitsústapinnisi</i>
ni-aahk-aanist-it-ohkit-opii	nisoi-ssksinitaksin-istsi	nit-it-mistap- innisi
1-EPIST-manner-RL-upon-sit.VAI	four-second-0PL	1-RL-away- fall.VAI

'It started to buck. I held onto its hair. I must have rode it for four seconds and I fell off.'

The fact that (207) is not actually incompatible with the event being an instantiation of the subject's actions is reflected in the observation that non-agentive predicates like *innisi* "fall," appear as if they can be coerced into the complement of *ohkott-* in specific contexts. For example, one can fall agentively or on purpose if one is a trick-rider at a rodeo, or in the context suggested in (196b). This "coercion" would be surprising given our previous observations about the (lack) of coercion allowed regarding event structure: recall from chapter 2 that Blackfoot strictly disallows achievements from being coerced into accomplishment readings. However, this "coercion" can be reframed as not being coercion at all, but rather a reading that is perfectly compatible (although rarely used) with the proposed unspecified semantics for v_{cause} .

I leave a careful investigation of Blackfoot causation (and subsequent modifications to the denotation in (207)) for further research; the point to take away here is that we can posit a semantics for non-agentive eventives in Blackfoot wherein non-agentive eventives are subject to the same temporal restrictions I have proposed for the agentive eventives: in order for the positive condition to hold true, P must hold, at the endpoint of t , in all of the worlds where a particular event occurred. In these worlds, P is settled as true at the endpoint of t . In order for the negative condition to hold true, P must not hold, at the endpoint of t , in at least one world where the event in question did not occur. This means that the initial point of t , from which both the P and not- P worlds are accessible, must be a time where P is not settled as either true or false. This means the initial point of t must be distinct from the final point of t - i.e., t must be a non-trivial

interval. This is why non-agentive eventives, like agentive eventives, can only be interpreted with respect to the non-instantaneous tense, t_{PAST} , unless they are first modified by a stativizing aspect.

The second point to clarify is the nature of the complements that v_{stit} and v_{cause} take. According to the analysis I am proposing, it is not the case that v_{stit} and v_{cause} apply to verb stems like *ihpiyi* "dance" and *innisi* "fall." The predicates that operators like v_{stit} and v_{cause} apply to are basic temporal predicates with no internal event/temporal structure: predicates like DANCE and FALL in (203) and (208) hold true of all times following an event of dancing or falling. Verb stems like *ihpiyi* and *innisi*, on the other hand, are semantically complex and encode temporal/event structure, via the (lexically encoded) semantic effect of operators like v_{stit} and v_{cause} . The system is spelled out in more detail as follows:

First, I have assumed that events are primary entities in the ontology. Events occur, having both temporal and spatial extent, where the moments that make up an event's temporal extent belong to the world in which that event occurs. Second, each of these events maps onto a basic predicate of type $\langle e, \langle i, \langle s, t \rangle \rangle \rangle$. Each basic predicate, \mathbf{p} , holds true of an \mathbf{x} , \mathbf{t} and \mathbf{w} where \mathbf{x} represents the (sum of the) individuals involved in the event, \mathbf{t} represents all of the times following the event's temporal extent and \mathbf{w} represents the world to which the moments contained within the event's temporal extent belong. The set of basic predicates derived from these events can be categorized according to the type of event that the predicate maps onto. Thus all of the dancing events map onto predicates within a subset of \mathbf{P} , DANCE. All of the eating events map onto a predicates within a subset of \mathbf{P} , EAT. Third, lexical entries like *ihpiyi-* do not map onto either (i) the set of dancing events, or (ii) the set of basic temporal predicates that these sets of events map onto. Rather, lexical entries like *ihpiyi-* incorporate operators like v_{stit} and v_{cause} , which introduce a level of dynamic temporal complexity that is not present in the basic temporal predicate, as follows:

$$(210) \quad \llbracket ihpiyi \rrbracket^{h,c} = \lambda e. \lambda t. \lambda x. \lambda w : \exists \mathbf{P} \in \text{DANCE}. [\tau(e) = t \& v_{\text{stit}}(\mathbf{P}, t, x, w)]$$

Whereas the basic predicates contained within DANCE are stative-like, as they can hold true of either instants or intervals, the denotation posited for *ihpiyi-* (due to the presence of the v_{stit} operator) can only hold true for intervals.

The third issue to clarify is whether or not v_{stit} and v_{cause} correlate to overt pieces of Blackfoot morphology. Blackfoot is a polysynthetic language with complex verb stems; recall that a Blackfoot verb stem consists minimally of what Algonquianists term an initial, and a final, where the 'initial' encodes what most would call the lexical root, and the final encodes information about whether or not the verb stem is transitive, and restrictions regarding the grammatical animacy of the arguments involved. It is tempting to correlate the v_{stit} and v_{cause} operators with the Blackfoot finals. Note, however, that (as far as I can tell) one cannot easily determine whether or not a Blackfoot verb stem is eventive (agentive or non-agentive) or stative based on the form of its final.

There is thus no independent reason to correlate v_{stit} and v_{cause} with overt pieces of Blackfoot morphology. My analysis only requires that the meaning of the entire Blackfoot verb stem - i.e., [initial + (medial) + final] - if the verb stem is eventive, contain either the v_{stit} or v_{cause} operator. Whether or not these operators correlate to specific parts of the verb stem I leave up to further research.

4.2.2 Action-Dependent Circumstantial Modals

I now turn to how to incorporate actions into a framework for circumstantial modality. Here I follow Brown (1988), who proposes that circumstantial claims like *will*, *can* (ability) and *might* quantify over actions as well as worlds. This allows for a four-way, as opposed to the traditional two-way (weak/strong), strength distinction. The four different degrees of strength allow the framework to account for the intuition that *will*, ability *can* and *might* (as well as their Blackfoot approximations) differ in terms of their strength - i.e., the intuition that *will* is stronger than ability *can*, which in turn is stronger than *might*. This intuition will be discussed further in section 4.4.1; for now I will assume that this sort of intuition is valid, and thus something that we want to represent with our theory. The four degrees of strength break down as in (211).

(211) Four Degrees of Strength

- | | | |
|----|-------------------------|------------------------------------|
| a. | $\forall a, \forall w'$ | "will" / <i>áak-</i> |
| b. | $\exists a, \forall w'$ | Ability "can" / <i>ohkott-</i> |
| c. | $\forall a, \exists w'$ | "might" ¹²⁶ |
| d. | $\exists a, \exists w'$ | "(weak) might" / <i>aahkama'p-</i> |

In prose, the analysis can be described as follows: A strong modal like *will* universally quantifies over both actions and worlds. A *will P* claim can thus be paraphrased as "All of the actions available to the agent are actions such that all of the worlds compatible with those actions are P-worlds." In other words, no matter what action the agent takes, P obtains. An ability claim on the other hand, only existentially quantifies over actions, and then universally quantifies over the worlds compatible with that action. With the Chierchia (1998) kind-inspired conceptualization I presented above, this can be paraphrased as follows (212):

(212) "There is an action, a, available to x in w at t, such that all of the (highest ranked) worlds

- (i) with instantiations of that action by x at t,
- (ii) compatible with x's circumstances in w at t,

126. Brown (1988) associates both the $\forall a, \exists w'$ and $\exists a, \exists w'$ options with the English lexical item *might* although he suggests that these correspond to two *mights*: *might_c* ($\forall a, \exists w'$) which is the dual of *can*, and *might* ($\exists a, \exists w'$) which is the dual of *will*.

are P-worlds”

The Brown (1988)-inspired approach to ability modals given in (212) can then be adapted into a specific denotation for *ohkott*- as follows (213).¹²⁷ In terms of the list of complex types presented in Table 4.3, the ability modal *ohkott*- takes a temporally-indeterminate property as its prejacent, and yields another temporally-indeterminate property.

$$(213) \quad \llbracket \textit{ohkott} - \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle} . \lambda t . \lambda x . \lambda w . \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$$

$$(i) \quad \forall w' [\llbracket R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(t, x, w)} \rrbracket \rightarrow P(t, x, w')] \&$$

$$(ii) \quad \exists P' [\forall x, w, t [P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]$$

The denotation can be broken down as follows. First, the denotation involves two modal bases:

It existentially quantifies over the actions in an “action MB.” This is represented by the function \mathcal{A} ; \mathcal{A} applies to an individual, world and time, and yields the set of actions available to that individual, x , in w , at time, t . These actions are then ranked by a bouletic/intentional ordering source $\mathcal{B}(x, w, t)$, so that only the highest-ranked actions - i.e., those actions geared towards fulfilling the agent’s goals/commitments in w at t - are considered within the existential quantifier’s domain of quantification. The existential quantification over actions allows the denotation to make reference to an action, a , in this set of highest-ranked actions available to the agent. The modal then universally quantifies over worlds with instantiations of that action.

This set of worlds is further restricted, however, by a circumstantial modal base, C and stereotypical ordering source, G : the modal only considers the worlds highest ranked by G which are compatible with x ’s circumstances in w at t . I assume that C and G are contextually-salient functions from $\langle x, w, t \rangle$ triples (or an equivalent schönfinkled function) to sets of propositions; C yields the set of propositions which describe x ’s circumstances in w at t , G yields the set of propositions which describe the general laws and patterns (which allow inductive inferences) that hold in x ’s circumstances in w at t . Note that ordering sources $\mathcal{B}(x, w, t)$ and $G(x, w, t)$ are indicated with subscripts like $\text{MB}_{\leq \text{OS}(x, w, t)}$ on the modal base (MB) they order; this is shorthand for $\text{MAX}_{\text{OS}(x, w, t)}(\cap \text{MB})$. I assume that $G(x, w, t)$ is used to rank the worlds in $\cap C(x, w, t)$ based on how many of the propositions in $G(x, w, t)$ hold true in those worlds: worlds with more of the propositions in $G(x, w, t)$ being true are higher ranked than those with fewer of the propositions in $G(x, w, t)$ being true. The MAX function then yields only the highest ranked worlds.

I similarly assume that the bouletic ordering source \mathcal{B} is a contextually-salient function from $\langle x, w, t \rangle$ triples (or an equivalent schönfinkled function) to a set of propositions: the propositions describing x ’s goals/commitments in w at t . The actions best suited to realizing these propositions

127. The denotation in (213) introduces a new short-hand notation: I use $P(t, x, w)$ as shorthand for $P(t)(x)(w)$.

are ranked higher than those that are poorly suited to realizing these propositions. The highest-ranked actions are those yielded by the $\leq_{\mathcal{B}(x,w,t)}$ function, and only these actions are quantified over.¹²⁸

The denotation in (213) also has an agentivity requirement encoded in (ii), in order to account for the data in section 4.1.2. This part of the denotation requires that *ohkott*-’s prejacent, the λP argument, entails the truth of a v_{STIT} predicate (i.e., that P is agentive). I have encoded the agentivity requirement as part of *ohkott*-’s truth-conditions, as opposed to encoding it as a presupposition, because negated ability attributions do not require their complement to be agentive, as shown below in (214). This contrasts with non-negated ability attributions, which suggests that the agentivity requirement is not a presupposition, as the requirement does not project through negation.¹²⁹

- (214) **Context:** Between the west coast and the desert plain where we used to live, there is a very tall mountain range. Because these mountains are so tall, any rainclouds that blow in from the ocean on the west cannot reach our desert. So rain can’t fall where we lived.

máátohkottsootááwaatsiksi
 máát-ohkott-**sootaa**-waatsiksi
 NEG-able-rain.vai-3:nonaff.sg

‘It wasn’t able to rain.’

Denotations for *áak*- and *aahkama’p*- are given in (215) and (216) respectively. These differ from *ohkott*- in terms of (i) whether they universally or existentially quantify over actions/worlds, and (ii) their lack of an agentivity requirement. Like *ohkott*-, they take temporally-indeterminate properties as their prejacent, and also have temporally-indeterminate properties as their output.

- (215) $\llbracket \acute{a}ak- \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x, w, t)_{\leq_{\mathcal{B}(x, w, t)}} \forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq_{\mathcal{G}(w, t)}}] \rightarrow P(t, x, w')]$

All of the actions, *a*, open to an agent, *x*, in *w* at *t*, that are best compatible with *x*’s desires/goals in *w* at *t*, are such that all of the worlds, *w*’, with instantiations of those

128. What does it mean to be “best suited to realizing a proposition”? In my conclusion chapter (chapter 8) I suggest that the bouletic ordering source $\leq_{\mathcal{B}(x,w,t)}$ can be re-framed in terms of some useful concepts from Decision Theory. Please see that chapter for more details.

129. The utterance in (214) was accepted as felicitous. However, like the English translation, it is not generally what would be used to describe the situation. A better way of describing the situation would be a negated imperfective generic claim, as below:

- (i) **Context:** Between the west coast and the desert plain where we used to live, there is a very tall mountain range. Because these mountains are so tall, any rainclouds that blow in from the ocean on the west cannot reach our desert. So rain can’t fall where we lived.

máátáíssootááwaatsiksi
 máát-á-**sootaa**-waatsiksi
 NEG-impf-rain.vai-3:nonaff.sg

‘It doesn’t rain.’

actions, that are also compatible with x 's circumstances in w at t , are worlds where P obtains at t .

$$(216) \quad \llbracket aahkama'p- \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\ \exists w' [R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)} \& P(t, x, w')]$$

There is an action, a , open to an agent, x , in w at t , that is one of the actions best compatible with x 's desires/goals in w at t . And there is a world, w' , with an instantiation of that action, that is also compatible with x 's circumstances in w at t , such that P obtains at in w' .

An important thing to note about all of the denotations for circumstantial modals presented here is that the temporal argument to the action and circumstantial modal base functions \mathcal{A} and C (i.e., the temporal perspective time) is the same as the temporal argument that satisfies the action-instantiation relation, R , and the temporally-indeterminate preajcent property, P . The correlation between the temporal argument that satisfies the modal bases, \mathcal{A} and C , and the action-instantiation relation means that the temporal perspective of the circumstantial modals correlates with the runtime of the action that the modals quantify over. The correlation between the temporal perspective time and action-runtime with the holding-time for the modal's preajcent, the temporally-indeterminate property P , means that the modals do not independently encode specific temporal orientations.

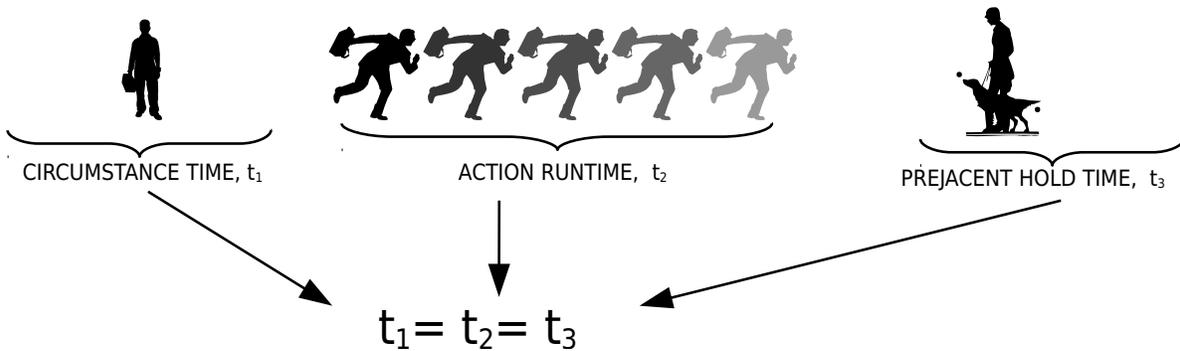


Figure 4.2: Correlation of Times for a Blackfoot Circumstantial Claim

The default temporal orientation is thus coincidence/identity, unless the temporally-indeterminate property denoted by the preajcent is itself modified by an aspectual operator. If the temporal perspective time is the instantaneous present (as is default for the “will” modal $\acute{a}ak-$ and the “might” modal $aahkama'p-$), an eventive preajcent (which cannot hold true of an instant) is logically incompatible. I propose that in these cases, the eventive preajcent is systematically interpreted as having first been modified by a null prospective aspect, as in (217).¹³⁰ Note that the prospective aspect is

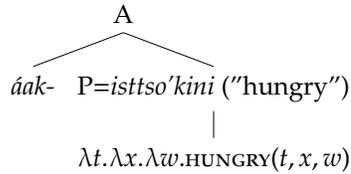
130. Independent evidence for a null prospective aspect comes from the availability of prospective interpretations outside of the complement of $\acute{a}ak-$ and $aahkama'p-$ (e.g., in the antecedent of conditionals), and the observation that

stativizing; the temporally-indeterminate property that prospective aspect modifies, P, is asserted to hold of a time, t' , that follows the evaluation time, t . This means that no matter what the aspectual properties of P are (i.e., whether it is itself stative or eventive), the prospectively-modified predicate $\emptyset_{\text{PROSP}}\text{-P}$ can hold true of either an instant or an interval.

$$(217) \quad \llbracket \emptyset_{\text{PROSP}} \rrbracket^{\text{h,c}} = \lambda P.\lambda t.\lambda x.\lambda w.\exists t'[P(t', x, w) \& t < t']$$

Thus, although modal constructions created with *áak*- “will” are the standard way of describing future events in Blackfoot, given the proposed denotation for *áak*- “will,” labelling *áak*- as a “future” modal is a misleading. “Future” *áak*- claims in Blackfoot, according to the analysis proposed here, are actually modal claims that, by default, have a present temporal perspective and a prospective temporal orientation. The systematic inclusion of prospective aspect with eventive prejacent is furthermore not lexically encoded in *áak*-, but rather a consequence of (i) a default present (instantaneous) temporal perspective t_0 and (ii) the incompatibility of eventive predicates with t_0 . This will be discussed further in chapter 6. The trees in (218) and (219) show the two types of complements that an *áak*- or *aahkama'p*- modal may take: (218) shows *áak*- taking an inherently stative predicate, wherein no additional aspect needs to modify *áak*-’s complement, and the temporal orientation is coincidence. (219) shows *áak*- taking an eventive predicate that has been stativized by means of a null prospective aspect; in this case, while the temporally-indeterminate property denoted by $\emptyset_{\text{PROSP}}\text{-P}$ is asserted to coincide with the temporal perspective time, the temporally-indeterminate property denoted by P is asserted to take place at some time following the temporal perspective time - i.e., a prospective temporal orientation.

(218) Stative Complements for *áak*-(and *aahkama'p*-)



$$\begin{aligned}
 \text{A} &= \lambda P.\lambda t.\lambda x.\lambda w.[\forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}} \\
 &\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}}] \rightarrow P(t, x, w')] (\lambda t.\lambda x.\lambda w.\text{HUNGRY}(t, x, w))
 \end{aligned}$$

$$\begin{aligned}
 &= \lambda t.\lambda x.\lambda w.[\forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}} \\
 &\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}}] \rightarrow \text{HUNGRY}(t, x, w')]
 \end{aligned}$$

All of the actions, a , available to the agent, x , in w at t , are such that, all of the worlds, w' , with instantiations of those actions (by x at t) that are also compatible with x 's circumstances in w at t , are worlds where x is hungry at t .

áak- and *aahkama'p*- do not necessarily encode prospective interpretations with stativized predicates. I return to this in chapter 6.

(ii) $\exists P'[\forall x, w, t[P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]]$

b. $\llbracket v_{\text{stit}} \rrbracket^{\text{h,c}} = \lambda P. \lambda t. \lambda x. \lambda w. \exists a \in \mathbf{Act}[R(a, x, w, t) \&$

(i) $\forall w'[R(a, x, w', t) \rightarrow P(\text{fin}(t), x, w')]$ (Positive Condition)

(ii) $\exists w''[\neg R(a, x, w'', t) \& \neg P(\text{fin}(t), x, w'')]$ (Negative Condition)

There are three issues to consider. Issue one: while *ohkott-* requires an agentive complement, *áak-* and *aahkama'p-* do not. Yet the intuition is that all three kinds of claims (*áak-* claims, *aahkama'p-* claims and *ohkott-* claims) involve reasoning about the agent's circumstances as well as the actions available to the agent, and hence involve quantification over actions as well as worlds. If agentivity were an integral part of the meaning of an action-dependent circumstantial modal, we would expect *áak-* and *aahkama'p-* to similarly have agentivity requirements, contrary to our observations.

One might suggest that it's not merely the action-dependency of circumstantial modals that yields an agentivity requirement, but the specific existential quantification over actions and universal quantification over worlds that yields the agentivity requirement. This leads to issue two: not all modals used to convey ability cross-linguistically have the agentive requirement that *ohkott-* has. English *can*, for instance, is used to convey ability, but can take non-agentive complements, e.g., "*It can rain hard in Vancouver.*"¹³¹ This suggests that the agentivity requirement associated with *ohkott-* is not an integral part of the meaning of circumstantial modals that existentially quantify over actions and universally quantify over the action-compatible worlds. If so, we would expect that all modals used to convey ability would be subject to the agentivity requirement that *ohkott-* has, but this does not appear to be the case. Rather, existential-universal action quantifiers can vary crosslinguistically in terms of whether they require their complement to be agentive. When the complement is interpreted agentively, their meaning approaches the sort of meaning that is hardwired into *ohkott-*'s semantics.

The third empirical issue is that an *ohkott-* claim like *iikhkottsspiyi* "She was able to dance" differs from a non-modal agentive claim *ihpiyi* "She danced" in terms of whether the action in question was intentional. While the action required to satisfy an *ohkott-* ability claim must be compatible with the agent's intentions/commitments (as shown in (221a)), this is not the case for a bare agentive claim (as shown in (221b)).

131. This argument is based on the assumption that *can* has a unified semantics. This, of course, is debatable. One might assume that the non-ability uses of *can* are purely existential circumstantial modals. Note, however, that (according to my judgements, "*It can rain hard in Vancouver*" is a stronger claim than "*It might rain hard in Vancouver*"; while the latter discusses an unverified possibility (e.g., don't know anything about Vancouver, but think you should pack your umbrella on your trip there just in case), the former is only felicitous if the speaker knows that Vancouver is a place where it rains hard (e.g., because I live in Vancouver and have experienced downpours). If *can* is purely existential, there needs to be some alternate reason for why it seems to make a stronger claim than *might*.

- (221) a. **Context:** My brother was making gingerbread, but he's not used to baking. He didn't realize that he needed to turn the tray halfway, because our oven is hotter on one side than the other. It burned, even though he was trying to watch it carefully, and really didn't want it to burn.

iihkottssinsstaki
 ii-ohkott-ssinsstaki-wa
 ic-ABLE-burn.VAI-3

'He was able to burn the food.'

Target: 'He managed to burn it.'

BB: It sounds like he was trying to burn the food.

- b. **Context:** My brother told me he'd make me nachos if I proof-read a paper for him. He doesn't use the kitchen very often though, so when he was trying to melt the cheese in the toaster oven, he accidentally lit it on fire and burned it.

anna Michael itssitskiísim omi iitsskonnikis
 ann-wa Michael it-ssitskiísi-m om-yi iitsskonnikis-yi
 DEM-3 Michael rl?-burn.VTI?-3:0 DEM-0 cheese-0

'Michael burnt the cheese.'

This difference is represented by *ohkott*'s denotation in that the quantification over actions introduced directly by *ohkott*- and the action-quantification introduced by the agentive-requirement clause have different restrictions. In the first case we are quantifying over the actions in $\mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)}$, which represents the set of actions available to the agent, x , in w at t , which are highest ranked by the agent's goals/desires/commitments in w at t . The actions quantified over have to be ones that are compatible with the agent's commitments. Actions obviously incompatible with the agent's commitments/desires can't satisfy the action-quantification introduced by a circumstantial modal, which is why it is infelicitous to make an *ohkott*- ability claim when the action necessary to facilitate the truth of the prejacent is/was incompatible with the agent's goals/desires/commitments. This is a property that *ohkott*- shares with *áak*- "will" and *aahkama'p*- "might," and this commonality is represented in all of their denotations in terms of the quantification over the actions in $\mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)}$. In contrast, v_{sit} quantifies over actions in **Act**, the (unrestricted) domain of actions. This means that inadvertent actions can satisfy the *vstit* operator; an agentive claim like "Meagan cut her finger" is felicitous, even though the action that the agent took to guarantee the truth of the agentive claim was inadvertent/incompatible with their desires/commitments. If the agentivity requirement were the only element in *ohkott*'s denotation that introduced quantification over actions, the difference in intentionality between an *ohkott*- claim like *iihkottssinsstaki* "He was able to burn (something)" and a non agentive claim like *itssitskiísim* "He burned it" would be unexplainable.

4.3 Implementation of Action-Dependent Analysis

4.3.1 Action-Dependent Ability: *ohkott-*

How can the approach to circumstantial modality and agentivity presented here account for the original puzzle? The surprising observation was that *ohkott-* claims, unlike *áak-* and *aahkama'p-* claims, are incompatible with present temporal perspectives, as shown in (222).

- (222) *ihkottsspiyi*
 ii-**ohkott**-ihpiyi-wa
 ic-**ABLE**-dance.VAI-3
 'He **was** able to dance.' ≠ 'He is able to dance.'

Recall that the denotation for the circumstantial modals is such that the temporal perspective time correlates with the holding time of the modal's prejacent. In the case of the ability modal, the modal's prejacent is additionally restricted in that it must be agentive (clause (ii) in the denotation, repeated below in (223)).

- (223) $\llbracket \text{ohkott-} \rrbracket^{\text{h,c}} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle} . \lambda t . \lambda x . \lambda w . \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$
 (i) $\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(t, x, w)}] \rightarrow P(t, x, w')] \&$
 (ii) $\exists P' [\forall x, w, t [P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]$

The agentivity requirement is formulated in a way so that the temporally-indeterminate property that *ohkott-* takes as its prejacent must be paraphraseable with a v_{stit} formula. In particular, it universally quantifies over the times at which *ohkott-*'s prejacent property holds true, and requires that those times are also times at which the temporally-indeterminate property $v_{\text{stit}}(P', t, x, w)$ holds true, where P' is some basic temporal predicate. Recall, however, that stative predicates (both lexical and derived) are temporally-indeterminate properties that can hold true of the instantaneous t_0 . At the same time, in a previous section I argued that the temporal argument satisfying the STIT predicate must be an interval, in order to satisfy the positive and negative condition - i.e., no matter what P' is, $v_{\text{stit}}(P', t, x, w)$ cannot hold true of t_0 . Thus for any case where P is stative, the agentivity requirement cannot hold true. The agentivity requirement thus restricts *ohkott-* not only from non-agentive prejacent, but also from having stative prejacent. Any time for which *ohkott-*'s non-agentive prejacent holds true of, must be an interval. And because the denotation is such that the prejacent's hold time is correlated with the temporal perspective time, this means that *ohkott-*'s temporal perspective time is likewise restricted to being an interval. Given Reis Silva & Matthewson (2008)'s system of tense for Blackfoot, where Blackfoot's present tense is instantaneous but the past tense is an interval, we thus predict that *ohkott-* claims can only take past evaluation times. A derivation for an *ohkott-* claim is given below.

Notice that the trick to solving the empirical puzzle lies in the particular way that the circumstantial modals are formalized into denotations. In particular, I have adopted the simplest formalization whereby all of the temporal variables within the denotation are bound by a single λt operator, as opposed to introducing additional operators to bind the different temporal variables. Because the λt operator binds the temporal variable introduced by the v_{stit} clause, the time that eventually satisfies the λt operator must be an interval like t_{IPAST} , as opposed to an instant like t_0 . And since the same λt operator binds the temporal perspective time (i.e, the temporal variable introduced by the modal bases \mathcal{A} and \mathcal{C}), the same restriction is placed on those times. While the method I have adopted is the simplest option, it is not the only option. Another logical possibility is one where we existentially quantify over the temporal variable that the v_{stit} operator is interpreted with respect to, as in the denotation below. This would restrict the t' variable associated with the v_{stit} requirement to being an interval, while allowing the t variable associated with the modal bases \mathcal{A} and \mathcal{C}) to be either intervals or instants - i.e., allowing for either a past or present temporal perspective (as appears to be the case for English *able to*).

- (225) $\llbracket \text{ABILITY} \rrbracket^{\mathcal{h}, \mathcal{c}} = \lambda P. \lambda t. \lambda x. \lambda w. \exists t' \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$ [
- (i) $\forall w' \llbracket [R(a, x, w', t) \& w' \in \cap \mathcal{C}(x, w, t)_{\leq \mathcal{G}(x, w, t)}] \rightarrow [P(t', x, w')] \rrbracket \&$
- (ii) $\exists P' \llbracket \forall x, w, t [P(t, x, w)] \rightarrow v_{\text{stit}}(P', t, x, w) \rrbracket$

4.3.2 Action-Dependent *áak-* and *aahkama'p-*

What about the temporal perspective of *áak-* and *aahkama'p-*? Although I propose that these modals similarly (i) quantify over actions and (ii) have temporal perspective times correlating with the possible runtimes of the events instantiating those actions, these modals differ in one crucial way: they lack the agentivity requirement that *ohkott-* has. This means that there is no restriction on the agentive, or temporal nature of their prejacent. As this results in no temporal restriction on the time for which the prejacent holds true, no temporal restriction is transferred through to the temporal perspective of these modal claims. Thus *áak-* and *aahkama'p-* claims can have either past or present temporal perspectives, as we saw in (189) and (190), repeated here in (226) and (227 for the reader's convenience.

- (226) a. **Context:** We're planning to take the train to Whistler, and I'm checking the train schedules, because it doesn't leave every day. I see that it leaves tomorrow, and tell you: The train leaves tomorrow.

áakomatapoo *apinákosi*
áak-omatap-oo *apinákosi*
 FUT-begin.to-go.VAI tomorrow
 'It will leave tomorrow'

PRESENT

- b. **Context:** My neighbour was born with heart problems, and her mother worries about her over- exerting herself. Tomorrow is her prom, and her mom is really worried

aahkama'piksskai'ihpiyi
aahkama'p-iik-sska-ihpiyi
might-INTS-INTS-dance.VAI
 'She might dance a lot.'

PRESENT

- (227) a. **Context:** My dad surprised my mom with a getaway weekend at a cottage. Because my mom is incurably nosy, and my dad is not the stealthiest person, we're discussing how lucky my dad was in pulling it off, because there are many ways my mom could have found out.

iisaámii'ihptopi omi iihtáipoyoo'p áakohkoissksinim
 ii-saami-ohtopi om-yi iihtaipoyo'p **ák**-ohkoissksini-m-wa
 ic-look.at.VAI-UNR DEM-0 phone **FUT**-find.out.VTI-LOC:3-3
 'If she had taken a look at the phone, she would have found out.'

PAST

- b. **Context:** Martina's hockey team was down a player, and they tried to get Heather in as a ringer, since she's a decent player, but Heather couldn't play, and they lost.

anna H ááwahkaa'wohtopi aahkama'pomo'tsaakiyaa
 ann-wa H waawahkaa-ohtopi **aahkama'p**-omo'tsaaki-yi-aawa
 DEM-3 H play.VAI-UNR **might**-win.VAI-3pl-DTP
 'If Heather had played, they might have won.'

PAST

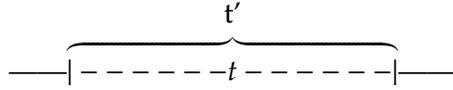
4.3.3 Action-Dependent Imperfectivity: *á*-

What about the imperfective? Recall that imperfective-marked ability attributions can be interpreted with either a past or present temporal perspective (192). In this section I show that this is exactly what we expect, given the semantics of the Blackfoot imperfective.

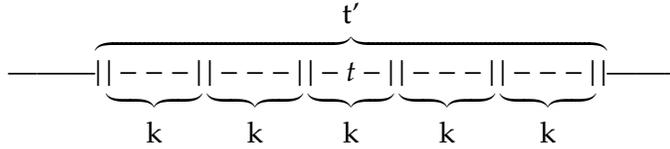
Following Deo (2009), I assume that imperfectives universally quantify over a regular partition of future-extended superintervals as follows: First you take a superinterval, t' , of the evaluation time, t . Then you regularly partition t' into equal intervals of length k . The imperfective then asserts that each of these k -intervals overlaps with a P-eventuality. This is represented by the diagram in (228). Note that an imperfective has a stativizing effect; even if its complement (a temporally-indeterminate property) can only hold true of an interval, the addition of the imperfective yields a predicate where that complement holds true not of the evaluation time provided by tense (or other higher temporal operator), but rather a predicate where a situation with the temporally-indeterminate property denoted by the complement overlaps with all the relevant subintervals of a superinterval of the evaluation time. This is possible whether the evaluation time itself is an interval (like t_{PAST}) or an instant (like t_0).

- (228) Universally quantifying over a regular partition

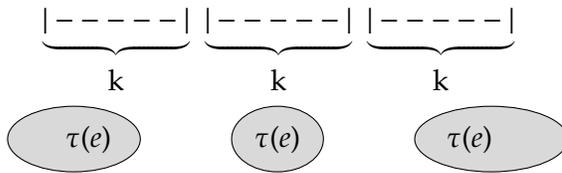
1. Take a superinterval, t' , of the evaluation time, t



2. Regularly partition t' into equal intervals, k .



3. Each of these k -intervals overlaps with a P-situation



Recall, however, from chapter 3, that imperfectives themselves require a modal semantics in order to account for the imperfective paradox. Following Dowty (1979), Portner (1998), Deo (2009), I assume that imperfectives involve quantification over circumstantially accessible worlds. In order to express the “no-interruption” ordering source and quantification over “inertial” worlds in an action-dependent framework, I propose that imperfectives and progressives quantify over worlds with instantiations of the agent taking a^\emptyset , the null action. Thus if the initial state is a non-stable one - i.e., one where the agent is in the middle of fulfilling an action - we only assert the existence of full P-events in worlds where the agent takes the null action and continues as planned. Worlds where the agent changes their mind are worlds where a non-null action is taken, and are outside of the domain of quantification. The Deo (2009)-inspired denotation for Blackfoot’s imperfective \acute{a} -, first presented in chapter 3, is repeated below for convenience.

(229) An Action-Dependent Blackfoot Imperfective:

$$\begin{aligned} \llbracket \acute{a}\text{-IMPF} \rrbracket^{\text{h,c}} &= \lambda P. \lambda t. \lambda x. \lambda w. \exists t' [t \subset_{\text{int}} t' \& \forall k \in \mathcal{RP}_t^C \\ &[\forall w' \in [\lambda w'. [R(a^\emptyset, x, w', t) \& w' \in \cap C(w, t, k)_{\leq G(w,t)}]] \\ &\rightarrow \exists t'' [P(t'', x, w') \& t'' \circ k]]] \end{aligned}$$

\mathcal{RP}_t^C is the ‘regular partition’ function: a function which takes an interval (t') and completely partitions it into regular subintervals, k , of a contextually determined length C .

$t \subset_{\text{int}} t'$ indicates that t is a subset of t' , but an *interior* subset - i.e., t does not contain the initial or final bound of t' .

For our purposes, the important factor is the lack of an agentivity requirement on the imperfective's complement. As was the case for *áak-* and *aahkama'p-*, the lack of an agentivity requirement means a lack of temporal restrictions on the time variable that satisfies the imperfective's circumstantial modal base restriction. We thus expect the imperfective to be compatible with either a present or past evaluation time - i.e., that the imperfective has a temporally stativizing effect. This is consistent with the proposed aspectual effect of the imperfective, and the data observed in section 4.2.

4.4 Benefits of an Action-Dependent Framework

I now move on to some benefits of the action-dependent framework presented here. First, I think it allows for a better characterization of the strength of ability modals. Second, it can account for the sometimes volitional characteristics associated with future modals like English *will* and Blackfoot *áak-*, allowing us to account for interactions between volitionality/dynamicity and temporal orientation. I will first discuss the relative strength of ability modals, and then discuss volition.

4.4.1 The Strength of Ability Modals

Various researchers have argued that the standard existential approach to ability is too weak (see Hackl (1998), Kratzer (2011), Hacquard (2006) for existential approaches, Xie (2012), Giannakidou (2001), Giannakidou & Staraki (2010), Thomason (2005), Kenny (1975), Brown (1988) for the contrary position). The intuition is that ability claims are stronger than other existentials, like "might" claims. This can be illustrated with the contrast between (230a) and (230b). While the *might* claim (230a) is felicitous in the low-probability context given, the ability *can* claim (230b) is not. The ability claim in (230b) seems to suggest a level of control on the part of the agent not satisfied by the context - i.e., that if the agent chooses to, she can guarantee hitting the last pin.

- (230) **Context:** Meagan is very bad at bowling, but somehow has managed to knock down all the pins but one.
- a. Meagan **might** hit the last pin and pick up a spare. ✓
 - b. ?Meagan **can/is able to** hit the last pin and pick up a spare. ×
 - c. # Meagan **will** hit the last pin and pick up a spare. ×

An obvious problem with treating ability attributions as universal claims, however, comes from examples like the following (based on examples from Thalberg (1969) and Bhatt (2006)).

(231) **Context:** Amelia was attempting to shoot arrows at a target. She is terrible. But by some fluke of nature, she managed to hit the target once.

Amelia **was able** to hit the target.

In this sort of context, it seems rather strong to claim that in all of the worlds compatible with the circumstances (even those where Amelia was committed to hitting the target), Amelia hit the target. Yet the ability claim is felicitous.¹³² Nonetheless, if we return to analysing the ability claim as an existential modal, we make the wrong prediction for the following context:

(232) **Context:** Amelia and I were attempting to shoot arrows at a target. We are both terrible. But Amelia, by some fluke of nature, managed to hit the target. All of her other attempts were just as poor as my failures. Heather, a world-class archer, declined to participate in our activities because it would have provided no challenge for her.

- a. Amelia was able to hit the target.
- b. # I was able to hit the target (but didn't).
- c. Heather was able to hit the target (but didn't).

This context is such that Amelia happened to be subject to a fluke, and managed to hit the target. Given an infinity of possible worlds, however, there is also a possible world where I was the one subject to this fluke instead. The existence of such a world should satisfy the truth-conditions of (232b), given an analysis of *able* as an existential quantifier over possible worlds. This does not appear to be the case - whereas (232a) is true, (232b) is not.

The action-dependent approach to circumstantial modality presented here can account for all of these observations. First, it allows for a distinction between the strength of *will*, *can/is able to* and *might* that the standard analysis of circumstantial modals does not - i.e., the contrast between the minimal triplet presented in (230). Weak *might* claims existentially quantify over actions and the worlds compatible with those actions; *can/is able to* claims are stronger because while they also existentially quantify over actions, they universally quantify over worlds. A *will* claim is still stronger as it universally quantifies over both the actions available to an agent, and the worlds compatible with those actions. The felicity of the 'fluke' case in (232a) is also expected under the action-dependent approach presented here; (232a) asserts something like: "There was an action open to Amelia at t in w_0 such that all of the worlds compatible with that action, that are also compatible with the facts in w_0 at t , are worlds where Amelia hit the target." Because the context is one where Amelia hit the target in w_0 , we know there was an action available to Amelia that resulted in her hitting the target (whatever action she took in w_0). And because the claim is restricted to worlds where Amelia took this action, *and* the relevant facts in w_0 hold, *where it is a fact of w_0 that*

132. From such cases, Bhatt (2006) concludes that the actuality entailment associated with an ability attribution, as opposed to the ability attribution, is the core semantic contribution of lexical items like *able*.

Amelia hit the target, all of these worlds are worlds where Amelia hit the target. In other words, because of the circumstantial restriction on the ability claim, the prejacent being true in w_0 entails the truth of the ability claim. We thus expect (232a) to be felicitous and true in the given context. The infelicity/falsity of (232b) is also expected. Unlike the previously discussed case, it is not a fact of w_0 that I hit the target.

As a point of clarification, Amelia's success at hitting the target is not due to her taking an action that was unavailable to the speaker in (232b). Rather, it was the fluke confluence of circumstances that rendered whichever action she took to be successful. For example, it may be the case that there was a lucky wind direction when she took the shot, and the sun getting in Amelia's eye caused her to aim differently than she might have otherwise. The speaker, taking the same action, was not subject to this lucky confluence of factors and failed to hit the target. This contrasts with a context where Heather decides to participate and hits the target. Unlike Amelia, she has trained her body to have a range of fine-grained arrow-shooting actions to choose from, where the particular action chosen can compensate for wind direction, glaring sun, etc. Heather's success in this context, unlike Amelia's, is due to the range of actions she has available to her, as opposed to random circumstances.

What about the felicity of (232c) "Heather was able to hit the target" in the original context where Heather chooses not to participate? It is also judged as true and felicitous in the given context, but for different reasons than the ones that make (232a) "Amelia was able to hit the target" true and felicitous. The intuition is that (232c) is felicitous for the same reason that the bowling example in (230b) is not: the ability attribution has a conditional-like quality regarding the agent's volitions. It seems to mean that the prejacent proposition obtains "if she chooses to (take one of the fine-grained actions required to hit the target)." According to the proposed analysis, this conditional-like "if she chooses to"-like quality follows from the existential quantification over actions; the truth of the prejacent is only asserted to hold in the worlds where the agent chooses to instantiate one of the actions she has available to her.

This intuition that ability has a conditional-like semantics is not new. Austin (1961) credits Moore (1903) with the view that an ability attribution involves a conditional semantics. More specifically, Austin (1961) attributes Moore (1903) with the view that *could have* is equivalent to something like *should have if I had chosen*; Baier (1963) formulates Moore (1903)'s proposed equivalence in terms of a paraphrase like "*N would, if he had chosen.*" Cross (1986) and Aune (1967) similarly consider the pros and cons of paraphrases for ability as in (233a) and (233b) respectively.¹³³ All of these approaches suggest that ability attributions conceal a conditional

133. Cross (1986) considers this sort of approach to the meaning of ability and argues against it. Cross (1986) actually proposes an equivalence between ability 'can' and "if I tried I might," as opposed to "if I tried I would" as per the strong formulation in (233a).

semantics.¹³⁴

- (233) a. x can ϕ if and only if
x would ϕ if x wanted (chose, tried, were motivated [*sic*], had the desire, etc.) to ϕ
- b. S could have done other than A =
S would have done other than A if he had willed (chosen, undertaken) to do so

Note that the approach I give here is not a conditional approach to ability. It is merely conditional-like in that the action-quantification imposes a restriction on (and hence reduces the number of) the worlds in the modal's domain of quantification. This parallels the way that a conditional antecedent restricts (and hence reduces the number of) the worlds in the modal's domain of quantification. It is crucial to clarify that I do not propose ability modals to be 'concealed conditionals' which involve a null conditional antecedent. In chapter 5 I will show that Blackfoot's ability modal *ohkott-* fails to license overt conditional antecedents. Under the assumption that covert conditional antecedents are subject to the same licensing conditions as overt ones, an analysis of Blackfoot *ohkott-* involving a null conditional antecedent is untenable. The introduction of quantification over actions allows me to account for many of the same intuitions as a conditional approach (i.e., ability's relative strength and "if she chooses to"-like quality), without relying on an actual conditional semantics.

As mentioned previously, the action-dependent approach to circumstantial modality also makes available four different grades of strength, repeated below.

- (234) Four Degrees of Strength
- | | | |
|----|-------------------------|------------------------------------|
| a. | $\forall a, \forall w'$ | "will" / <i>áak-</i> |
| b. | $\exists a, \forall w'$ | Ability "can" / <i>ohkott-</i> |
| c. | $\forall a, \exists w'$ | "might" |
| d. | $\exists a, \exists w'$ | "(weak) might" / <i>aahkama'p-</i> |

I have discussed the English and Blackfoot instantiations of three of the four options, but have not discussed the third ($\forall a, \exists w'$) logical possibility. Brown (1988) associates both the $\forall a, \exists w'$ and $\exists a, \exists w'$ options with the English lexical item *might* although he describes *might_c* ($\forall a, \exists w'$) as the dual of *can*, and *might* ($\exists a, \exists w'$) as the dual of *will*. Whether a language may provide distinct lexical items to correlate with all four options is a question I leave for further research.

134. These works do not explicitly discuss the empirical observations underlying this intuition; they focus more on the issue of whether ability is compatible with certain logical frameworks.

4.4.2 The Volitional Component of “Future” Modals

The action-dependent framework can also account for the volitional readings associated with future modals like Blackfoot *áak-* and English *will*. The observation is that Blackfoot *áak-*, like English *will*, often appears to be a claim about the agent’s plans or volitions, as opposed to being a claim about the agent’s circumstances. This effect is especially noticeable when *áak-* and *will* are used in the antecedent of conditionals, a context where prospective readings in the absence of *áak-* and *will* are already acceptable. Consider the minimal pair in (235a) and (235b), where the former antecedent has *áak-* and the latter does not. My consultant suggested that while both are acceptable, the *áak-*-marked (235a) would be used in a context where the agent is a willful child and will only dance when he feels like it. The unmarked form in (235b) lacks this extra claim about the agent’s willfulness/desires.

(235) **Context:** We’re having a festival, and we’re wondering if a certain person will dance.

- a. *kamáakihpiyisi, áaksikoka’pii*
 kam-áak-ihpiyi-si, áak-ik-sok-a’pii-wa
 if-FUT-dance.VAI-SBJ:3, FUT-INTS-good-bism.VII-3
 ‘If he *does* dance, it’ll be good.’
- b. *kamihpiyisi, áaksikoka’pii*
 kam-ihpiyi-si, áak-ik-sok-a’pii-wa
 if-dance.VAI-sbj, FUT-INTS-good-bism.VII-3
 ‘If he dances, it’ll be good.’

The minimal pair in (236a) and (236b) show a similar contrast. The *áak-*-marked antecedent in (236a) can be used in a context where the name-picking process is rigged, and the organizers have already planned to pick a certain individual’s name. The unmarked antecedent in (236b) lacks this extra claim about the agent’s plans/volitions.

(236) **Context:** We’re having a festival, and we haven’t had enough volunteers to dance, so the organizers are going to pull names out of a hat.

- a. *kamáaksspisotowa’si otsinika’sim áakihpiyi*
 kam-áak-sspisotowa’-si ot-inika’s-im áak-ihpiyi-wa
 if-FUT-dance.VAI-SBJ:3 3-name-poss FUT-dance.VAI-3
 ‘If they’re going to pick his name, he will dance.’
- b. *kamsspisotowa’si otsinika’sim áakihpiyi*
 kam-sspisotowa’-si ot-inika’s-im áak-ihpiyi-wa
 if-dance.VAI-SBJ:3 3-name-poss FUT-dance.VAI-3
 ‘If his name is picked, he will dance.’

I address this facet of the action-dependent framework in chapter 6, but to preview: in the system that I have set up here, volition is implemented as an ordering source on the action modal base $\mathcal{A}(x,w,t)$. The actions yielded by $\mathcal{A}(x,w,t)$ are ordered by the agent's volitions in w at t , $\mathcal{B}(x,w,t)$, and only the actions best suited to realizing these volitions are used to restrict the modal's domain of quantification. Because *áak*- universally quantifies over these actions, an *áak*- claim can be used as an indication of the agent's volitions: the prejacent must be compatible with all of the possible actions that the agent is considering. Barring circumstances out of the agent's control, the prejacent must be something that the agent is committed to - either because they are aiming for it, or are resigned to it. In contrast, *ohkott*- only existentially quantifies over the volitionally-ordered action set and thus is not a reliable indication of the agent's volitions: the prejacent only need be compatible with some of the actions the agent is considering. It may be incompatible with other actions that the agent is still considering. This suggests that the prejacent is not something the agent is committed towards. Hence while *áak*- claims are associated with a flavour of volition/commitment, *ohkott*- claims are not.

One part of the analysis that I do not attempt to address in any detail, however, is a formalization of what constitutes the difference between a desire, plan, or volition. Here I suggest that the reader consult Lauer & Condoravdi (To appear). Their notion of an "action-relevant preference" captures exactly the type of mental object I mean to be contained within $\mathcal{B}(x,w,t)$. That is, while I assume that an individual's desires and obligations may be internally inconsistent, one can identify a subset of this set of mental objects that the individual has committed to. These are preferences that the individual is willing to take actions towards fulfilling - i.e., "action-relevant preferences." These are the sort of preferences that rank the actions available to the agent.

4.4.3 A Note on *ohkott*'s Temporal Orientation

An interesting thing to note about the system that I've proposed here is that it forces an analysis where Blackfoot's ability modal always takes a perfective containment temporal orientation. This is necessary in order to satisfy its agentivity requirement: in order for the positive condition to hold at the end of the temporal perspective time, the event which makes the positive condition true must have occurred prior to that point. The event must also occur after the initial point of the temporal perspective time, because otherwise the negative condition would not hold. Thus the modal event must be contained within the temporal perspective time - i.e., a perfective containment temporal orientation. This is contrary to Matthewson (2012)'s suggestion that circumstantial modals uniformly take prospective temporal orientations (see also Condoravdi (2002), Abusch (2012), Kratzer (2012), among others). In upcoming chapters I show that a perfective containment temporal orientation for *ohkott*- can explain many otherwise puzzling properties about Blackfoot. For instance, in chapter 5 I show that a modal's temporal orientation correlates with its ability to license causally-interpreted conditional antecedents. The ability modal *ohkott*'s inability to license causally-interpreted conditional antecedents follows if it encodes a perfective as opposed

to prospective temporal orientation. In chapter 7 I follow Kratzer (2011) and Matthewson (2012) in taking prospective aspect to be a key ingredient in avoiding actuality entailments. The ability modal's incompatibility with a prospective temporal orientation can then be used to explain the presence of actuality entailments in unexpected contexts.

4.5 An Extension: On the Topic of Epistemic Modality

4.5.1 Doubly-Quantified Epistemic Modals

The framework presented in this chapter is an approach to circumstantial modality. I propose, however, that the double-layered quantification proposed here can be paralleled in the epistemic domain. So what is the epistemic parallel to actions?

I suggest that the inferences expressed by circumstantial and epistemic modal claims correlate with two different kinds of reasoning: practical reasoning and theoretical reasoning: practical reasoning aims to figure out how individuals should act; deciding on a particular action is the goal of practical reasoning. Theoretical reasoning, on the other hand, aims to determine what an individual believes (cf. Rips & Adler (2008)). The proposed correlation of epistemic and circumstantial modality to theoretical and practical reasoning respectively is reflected in the following quote from Kratzer (1991):

"Epistemic modality is the modality of curious people like historians, detectives, and futurologists. Circumstantial modality is the modality of rational agents like gardeners, architects and engineers. A historian asks what might have been the case, given all the available facts. An engineer asks what can be done given certain relevant facts."
(Kratzer 1991: 646))

I suggest that hypotheses are the goal of theoretical reasoning, and hence the epistemic parallel of actions. Just as the **ACTIONS** available to an agent can be inferred from the agent's volitions and desires (i.e., a bouletic conversational background) via practical reasoning, **HYPOTHESES** can be inferred from the speaker's evidence (i.e., an evidential conversational background) via theoretical reasoning. With this parallel in mind, I propose that while circumstantial modals quantify over volition-based actions (in addition to quantifying over circumstantially accessible worlds), epistemic modals quantify over evidence-based hypotheses (in addition to quantifying over doxastically accessible worlds).¹³⁵ The correlation between hypotheses and actions is schematically represented below:

(237)	Desires/Goals	~PRACTICAL REASONING~	Actions
	Evidence	~THEORETICAL REASONING~	Hypotheses

135. I tentatively suggest that hypotheses can be formalized as sets of propositions from which the information in an evidential modal base can be derived (similar to Veltman (2005)'s notion of a basis).

Introducing quantification over hypotheses into the semantics of epistemic modals predicts, as we saw in the circumstantial domain, a four-way distinction in strength:

(238) Four Logical Possibilities for Strength:

1. $\forall h, \forall w'$ "must have"
2. $\exists h, \forall w'$
3. $\forall h, \exists w'$
4. $\exists h, \exists w'$ "might have"

The system also predicts the existence of systems with variable-strength modals. As the number of hypotheses available to a speaker decreases, an existential quantifier over hypotheses approaches the strength of a universal quantifier over hypotheses. We thus expect the existence of modals whose strength depends on the number of hypotheses compatible with the speaker's evidence. Does natural language make use of the mechanisms that a hypothesis-dependent approach to epistemic modality provides? In the following subsection, I propose that some data from Nsyilxcen (Okanagan) Salish, which is problematic for previous approaches to modals with contextually-varying strength, can be accounted for under the system outlined above.

Menzies (2013) on *mat* and *cmay*

Menzies (2013) identifies two epistemic modals in Nsyilxcen: *mat* and *cmay*. While *cmay* is only felicitous in possibility contexts, *mat* is compatible with possibility and necessity contexts, and tends to be translated accordingly. This can be illustrated with the data in (239).

(239) **Context:** A father is taking his young son out to teach him how to hunt. They come across a broken branch on the trail and the leaves of the nearby bush have been flattened. These are signs that a large animal like a bear has been by this way.

- a. The son doesn't know much about hunting or tracking animals. The son says:

mat *ata?* *xi?wílx* *i?* *skΔm'xíst*
EPIST.MOD DEM walk.by DET bear
 'A bear **might** have come by here.'

- b. His dad is very good at hunting and tracking and he is teaching his son everything he knows about tracking animals. The dad says:

mat *ata?* *xi?wílx* *i?* *skΔm'xíst*
EPIST.MOD DEM walk.by DET bear
 'A bear **must** have come by here.'

In the context given, there is evidence for a large animal having gone by. The son, who knows little about hunting/tracking, makes a *mat* claim which is interpreted as weak and translated as

“might.” If the exact same claim is made by the father, however, who knows enough about hunting/tracking to be more sure about what sorts of animals make the sort of observed tracks, the *mat* claim is interpreted as strong and translated as “must.” The modal *mat* is thus a variable-strength modal.

Menzies (2013) considers two analyses in the style of Peterson (2010) and Rullmann et al. (2008). One possibility is that the variable-strength modal *mat* is lexically encoded as a strong modal - i.e., a universal quantifier over worlds. Because universal claims are stronger when the domain of quantification is larger, however, the variable strength can be modelled in terms of the modal’s ordering source varying the domain size. If the number of propositions in the ordering source decreases (or is zero), fewer worlds are ruled out, and the larger the domain of quantification. This would result in a stronger claim. I suggest, however, that this account cannot explain the data in (239): if this were the case, the son, having less knowledge and fewer propositions in his ordering source, and being less able to rule out unlikely worlds, should have the stronger claim. But this is not the case.

The second possibility that Menzies (2013) considers is one where the variable-strength modal *mat* is lexically encoded as a weak modal - i.e., as an existential quantifier over worlds. Because existential claims are stronger when the domain of quantification is smaller, the variable strength can likewise be modelled in terms of the modal’s ordering source varying the domain size. If the number of propositions in the ordering source decreases (or is zero), fewer worlds are ruled out, and the larger the domain of quantification. This would result in a weaker claim. This reflects the data observed in (239): the son, with less knowledge, can rule out fewer worlds, and he has a weaker claim. However, as Menzies (2013) points out, the existence of the non-variable weak modal *cmay* is problematic for this account. If both *mat* and *cmay* are lexically encoded as weak modals (existential quantifiers over worlds), and *mat*’s strength is increased via context (i.e., via the kind of ordering source made available to the speaker), why can *mat*’s strength, but not *cmay*’s strength, be increased? This approach would require some sort of stipulation that *cmay* cannot be contextually-strengthened.

I propose that the Nsyilxcen data can be accounted for with the doubly-layered quantificational approach to epistemic modals suggested here. Consider a modal that existentially quantifies over the hypotheses available to the speaker, and then universally quantifies over the worlds compatible with that hypothesis. As the number of hypotheses available to the speaker decreases (e.g., because more evidence is available to the speaker, or because the speaker knows more about the way the world works and can rule out stranger hypotheses), the strength of an existential quantifier over hypotheses will approach the strength of a universal quantifier over hypotheses. Thus the strength of the modal will increase. This can account for *mat*’s variable strength. The non-variable *cmay* can be formalized as an epistemic modal that existentially quantifies over both the hypotheses

available to the speaker and the worlds compatible with that hypothesis. Such a modal, while still subject to contextual strengthening, should not approach the strength of a strong universal claim because even if there is only one hypothesis compatible with the speaker's evidence, the modal still only existentially quantifies over worlds compatible with this hypothesis.¹³⁶

$$(240) \quad \text{a. } \llbracket \text{mat} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda w. \exists h \in \mathcal{H}(\text{Sp}(c), w, t)_{\leq \mathcal{E}(\text{Sp}(c), w, t)} \\ [\forall w' [R(h, w', t) \& w' \in \cap D(\text{Sp}(c), w, t)_{\leq \mathcal{G}(w, t)}] \rightarrow P(w', t)]$$

$$\text{b. } \llbracket \text{cmay} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda w. \exists h \in \mathcal{H}(\text{Sp}(c), w, t)_{\leq \mathcal{E}(\text{Sp}(c), w, t)} \\ [\exists w' [R(h, w', t) \& w' \in \cap D(\text{Sp}(c), w, t)_{\leq \mathcal{G}(w, t)}] \& P(w', t)]$$

$\mathcal{H}(\text{Sp}(c), w, t)$ is the set of hypotheses available to the speaker, Sp, in w at time t.

$\mathcal{E}(\text{Sp}(c), w, t)$ is the evidence available to the speaker, Sp, in w at time t.

$\mathcal{D}(\text{Sp}(c), w, t)$ is the beliefs of the speaker, Sp, in w at time t.

In summary, although the doubly-quantified modal approach I have presented in this chapter is geared towards an analysis of circumstantial modals, a parallel analysis can be implemented towards an analysis of epistemic modals. Further, while the system of epistemic modality documented for Okanagan Salish by Menzies (2013) is problematic for previous approaches to variable-strength modals, the doubly-quantified modal approach that I have presented here provides a plausible way to capture the generalisations.

4.5.2 Blackfoot Epistemics and Temporal Perspective

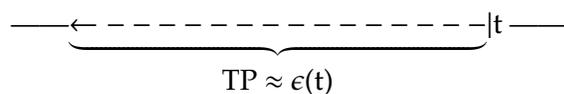
I have argued that the temporal perspective of action-dependent circumstantial modals in Blackfoot correlates with the runtime of the action that the modals quantify over. What about the temporal perspective of epistemic modals? I have argued that epistemic modals involve quantification over evidence-based hypotheses, where evidence-based **HYPOTHESES** can be formalized similar to Veltman (2005)'s notion of a basis: a set of propositions from which the propositions in an evidential conversational background can, via theoretical reasoning, be inferred. But if the epistemic parallel of an action is a hypothesis, what is the epistemic parallel of the *runtime of an action*?

A hypothesis has to account for the evidence gathered within a particular time interval; I suggest that the temporal perspective of epistemic modals in Blackfoot correlates with this time interval,

136. The contextual-strengthening of an $\exists h \exists w$ modal is not logically ruled out, however. Logically, if (i) the evidence were such that only one hypothesis were available to the speaker, and (ii) given what the speaker believes, there is only one world compatible with that hypothesis, such a modal would approach universal strength. But given the multiplicity of possible worlds, condition (ii) is implausible.

which I will call the ‘evidence time.’ But evidence-based theoretical reasoning, unlike volition-based practical reasoning, is not particularly time-sensitive. Unlike prior desires and volitions, prior evidence does not become irrelevant. New evidence does not make older, conflicting, evidence irrelevant; a rational agent rather must reinterpret the older evidence in a way so that it is not in conflict with the new evidence. For this reason, I suggest that the time interval associated with the temporal perspective of epistemic modals in Blackfoot (i.e., the evidence time) is always a past-unbounded time interval. In what follows I present some data that shows that this is on the right track.

(241) Proposed Temporal Perspective time for Epistemic Modals:



Where ϵ is the function that takes a time, t , and yields the past-unbounded interval right-demarkated by t .

Recall from chapter 1 that there are two Blackfoot epistemic modals, *aahk-*, usually translated as “must (be/have),” or “I think/guess” and *aahkam-*, usually translated as “might/must (be/have)” (cf. Reis Silva (in Prep)). Examples of these are given in (242) and (243) respectively.

(242) *aahksoowatoom annihkayi po'tstákssin*
aahk-iowaatoo-m annihkayi po'tstákssin
must-eat.VTI-3:0 dem.invis sandwich
 ‘He must have eaten the sandwich.’

(243) *aahkamsoowatoom annihkayi po'tstákssin*
aahkam-iowaatoo-m annihkayi po'tstákssin
EPIST-eat.VTI-3:0 dem.invis sandwich
 ‘He might have eaten the sandwich.’

Chen et al. (Under Reviewb) show that Blackfoot *aahkam-* is compatible with both a past and present temporal perspective. This is shown in (244) and (245) below. The context in (244) is one where Tiny stealing the painting was compatible with the evidence I had available to me yesterday, but is no longer compatible with the current evidence. Thus the *aahkam-* case in (244) must be an instance of a past temporal perspective.

(244) **Context:** Someone stole a famous painting from a museum three days ago. Yesterday I had it narrowed down to three suspects: Blue-eyes, Eagle, and Tiny, and I had them all brought in for questioning. Today, however, I found a blonde hair at the scene of the crime, which rules out the dark-haired Tiny as a suspect. When my supervisor reviews the evidence and asks me why I bothered bringing in Tiny for questioning yesterday, I explain: Yesterday Tiny might have still stolen the painting.

matónni aahkamikamo'tsatsii annisk sinááksin
matónni aahkam-ikamosat-yii-wa annisk sinááksin
 yesterday **EPIST-steal.VTA-3:3'-3** DEM painting
 'Yesterday she might have stolen that painting.'

In contrast, (245) is a claim based on present evidence, i.e., a case of a present temporal perspective.

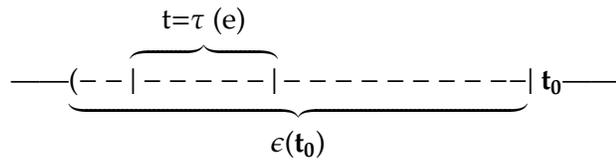
(245) **Context:** I'm watching the security feed for the museum, which has a very famous painting on display. At one point, I see a man walk into the screen, then the video security feed goes fuzzy. When the feed comes back on, everything looks to be in place. But later I learn that the man I saw on the video feed is a famous art-thief and counterfeit artist. Even though everything looked to be in place when the feed came back on, for all I know, the painting that's there now might be a forgery. Stunned, I realize: He might have stolen the painting/ Maybe he stole the painting.

oma nínaa aahkamikamo'tsatsii annisk sinááksin
oma nínaa aahkam-ikamo'tsat-yii-wa annisk sinááksin
 DEM man **EPIST-steal.VTA-3:3'-3** dem painting
 'That man might have stolen that one painting.'

Chen et al. (Under Reviewb)'s main claim is that modals crosslinguistically do not, on their own, encode temporal information. Rather, their temporal perspective is given by tense (or whichever temporal element merges after the modal), and their temporal orientation is given by aspect (or whichever temporal element last applied to the modal's preadjacent). I suggest that their basic claim should be modified so that tense does not directly provide *aahkam*'s temporal perspective time, but rather demarcates the right-edge of a past-unbounded time interval (the evidence time) that provides *aahkam*'s temporal perspective time. Without this modification, the range of temporal orientations allowed is problematic for Chen et al. (Under Reviewb)'s analysis.

Consider (245), which has an eventive complement. If Blackfoot's instantaneous present demarcates the right-edge of a past-unbounded interval that acts as *aahkam*'s temporal perspective time, we expect the bare eventive to be interpreted by default as perfective/contained within this interval, just as bare eventives are interpreted as perfective/contained with respect to a contextually-salient past interval. We then expect the event described by the eventive complement in (245) to be interpreted as being contained within a past-unbounded interval. This indeed reflects the temporal interpretation of (245); the event of stealing described by the complement is past.

(246) The Temporal Orientation of *aahkam-*



If, on the other hand, Blackfoot’s instantaneous present directly provided *aahkam-*’s temporal perspective time, we would expect two possibilities for an eventive complement. Either (i) the combination should be ruled out as impossible, as eventives are inherently dynamic and thus incompatible with an instantaneous evaluation time, or (ii) the eventive complement should be systematically interpreted as having first been modified by a (stativizing) null prospective aspect, resulting in a prospective/future interpretation. But neither of these two options obtain. An eventive complement for *aahkam-* is allowed, and, as shown in (247), it is interpreted such that the event in question (raining), occurred prior to a present evaluation time.¹³⁷

(247) **Context:** It’s not raining now, but the ground looks wet.

aahkamsootaaa

aahkam-sootaa-wa

EPIST-rain.VAI-3

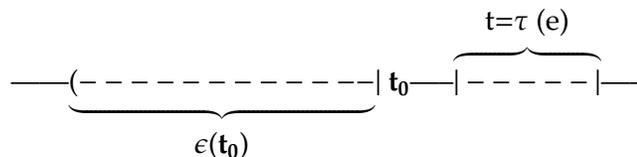
‘It may have rained.’

BB: You’re seeing the porch all wet, but the sun is out.

≠ “It might rain.”

This suggests that the temporal perspective time of Blackfoot epistemic *aahkam-* is indeed an interval right-demarkated by tense, where this past-unbounded interval correlates with the evidence time for the hypotheses that *aahkam-* quantifies over.

(248) Unattested Temporal Orientation for *aahkam-*



137. The reader should be aware that I have not focussed on Blackfoot’s epistemic modals in my fieldwork, and the generalisations regarding the temporal orientation of *aahkam-* presented here are the result of preliminary fieldwork. Thus while a future temporal orientation for *aahkam-* is so far unattested in my field notes, I have not attained conclusive data showing that *aahkam-* would be infelicitous in future-oriented contexts. I leave this for further research. In any case, the apparently past temporal orientation associated with (247) could not be explained in a system where the complement of epistemic modals are directly evaluated with respect to a temporal perspective time provided by tense. Some mechanism is thus required to temporally extend the time argument provided by present tense, so that the event can be interpreted as being contained within a past-extended interval demarcated by a present evaluation time.

Similar arguments can be made for Blackfoot's other epistemic modal *aahk-*; epistemic *aahk-* differs from *aahkam-*, however, in that it always appears to take a present temporal perspective. In other words, it appears to be incompatible with a past temporal perspective (cf. Reis Silva (in Prep)). Nonetheless, observe that the instantiation time of *aahk-*'s complement follows the system Reis Silva & Matthewson (2008) propose for non-modal predicates: if *aahk-* takes an unmarked eventive preajcent, the modal claim is interpreted with a past temporal orientation (249a); if *aahk-* takes a stative or "stativized" preajcent (249b, c, d), the modal claim can be interpreted with a present temporal orientation (cf. Reis Silva (in Prep)).

(249) a. Unmarked (Past)

Context: Piitaaki has broken into our camp, stolen something, and then managed a successful escape. We tap her friend's phone, and when Piitaakii contacts her, we hear a horse whinnying. There are only stables to the west or east, so we conclude that she stole a horse from a stable and:

kamííkamo'tsisi *ponokaomitaa,* *aahkohto'too* *nimmohotsi*
 kam-ikamosat-yii-si ponokaomitaa, **aahk**-ooht-o'too-wa nimm-ohtsi
 if-steal.VTA-3:3'-**SBJ**:3 horse, **EPIST**-source-arrive.VAI-3 west-direction
tsaahto isskihtao'ohtsi
 tsaahto isskihtao'-ohtsi
 or east-direction

'If she stole a horse, she must have gone west or east.'

b. Imperfective/Progressive

Context: My sister and brother-in-law, the parents to my niece, are coming over for dinner, but my brother in law, the father of my niece, gets to our house after my sister and niece. He looks at the time, and sees that it's about time for the baby to be hungry. He notices that the house is quiet, and figures:

kámsawaasai'nisi, *aahkáísttaa*
 kam-sa-waasai'ni-si, **aahk**-á-sstaa-wa
 if-NEG-cry.VAI-SBJ:3, **EPIST**-IMPF-NURSE.VAI-3

"If she's not crying, she must be nursing."

c. Stative (Stage-Level)

Context: Hermione is worried about Snape, who seems to have gone to play double agent. Ron, who doesn't like Snape much, worries more about Professor Lupin, who only ate a small steak, which isn't very much for a werewolf. He muses:

kamsáóowatsiisi *annisk* *Snape,* *aahksittso'kini*
 kam-sa-oowat-yii-si annisk Snape, **aahk**-isttso'kini
 if-NEG-eat.VTA-3:3'-**SBJ**:3 DEM Snape, **EPIST**-hungry.VAI

'If he didn't eat Snape, he must be hungry.'

d. Stative (Individual level)

Context: You meet someone with my last name 'Louie.' You know that some of the coastal First Nation's people have that last name too, and that they sometimes look like they could be Chinese too. You tell me about him, asking if he's my relative, because:

kamííksokoainiki *aahkáápatamssts sinimaa*
kam-ikso'kowa-iniki **aahk**-wáápatamsstsinnimaa-wa
if-relative.nar-SBJ:loc **EPIST**-be.chinese.VAI-3

'If he's your relative, he must be Chinese.'

Note that while stative prejacent can be interpreted with a present temporal orientation, they don't have to be. They are also compatible with past temporal orientations, as shown in (250). This is exactly parallel to what Reis Silva & Matthewson (2008) observed about unembedded stative predicates in Blackfoot.

(250) **Context:** I made my dad a giant sandwich, practically the size of two meals. But when I get home, I see that it's all gone. I reason:

aahksiksstonnatsistso'kini
aahk-ik-sstonnat-isttso'kini-wa
EPIST-INTS1-INTS2-hungry.VAI-3

'He must have been hungry.'

These generalisations about temporal orientation follow from an analysis where *aahk*'s temporal perspective time correlates with its evidence time - i.e., with a past-unbounded interval demarcated by the utterance time: the bare eventive in (249a) can be interpreted as perfective/contained within this evidence interval. If, on the other hand, we assumed that Blackfoot's instantaneous present provided *aahk*'s temporal perspective time, we would predict the bare eventive in (249a) to either (i) be impossible or (ii) receive a prospective temporal interpretation, following the same reasoning discussed for *aahkam*- above. Because neither of these possibilities are attested, I conclude that the evidence better supports an analysis where *aahk*'s temporal perspective time correlates with its evidence time, a past-unbounded interval demarcated by the utterance time.

In chapters 5 and 7 I provide further evidence that *aahk*'s temporal perspective time is a past-extended interval right-bounded by the utterance time: in chapter 5, I show that Blackfoot SUBJUNCTIVE conditional antecedents appear to be temporally interpreted with respect to the temporal perspective time of their licensing modal. Given that SUBJUNCTIVE antecedents in conditionals headed by the modal *aahk*- can be interpreted as perfective, where perfectives can only hold true of non-trivial intervals, the temporal perspective time must be a non-trivial interval. Thus although the temporal perspective of an *aahk*- claim appears to be present, an analysis where *aahk*'s temporal perspective actually correlates with its evidence time - a non-trivial interval bounded by the present t_0 - is preferable as it allows us to maintain our basic assumptions about Blackfoot

tense and aspect. In chapter 7 I look at the interaction between actuality entailments and temporal orientation. If we assume that *aahk-* takes a perfective temporal orientation, as I have argued for *ohkott-*, we can account for interesting parallels between *aahk-* claims and the actuality entailments associated with *ohkott-*.

4.6 Chapter Summary and Reflections

In this chapter I presented a previously undocumented pattern regarding the range of temporal perspectives that Blackfoot circumstantial modals allow. Specifically, I showed that while Blackfoot *áak-* “will” and *aahkama’p-* “might” are compatible with both past and present temporal perspectives, the ability modal *ohkott-* requires additional aspectual modification in order to be interpreted with a present temporal perspective. I presented an action-dependent semantics for agentivity and circumstantial modals in order to account for this contrast. Assuming that the temporal perspective of Blackfoot circumstantial modals correlates with the runtime of the action that the modals quantify over, the proposed system can account for the restricted patterns of temporal perspective. It also provides a way of incorporating volition into the semantics of circumstantial modals that can account for observations regarding the correlation between dynamicity/volition and temporal orientation.

An interesting thing to note about the system I’ve presented here is that in order for all agentive predicates in Blackfoot to behave as they do, all agentive predicates must encode their agentivity via the interval-requiring v_{STIT} operator proposed here - i.e., it cannot be the case that some agentive predicates use an agentivity operator like v_{STIT} , while other agentive predicates use Belnap (1992)’s *astit* and yet other agentive predicates use Belnap & Perloff (1988)’s *dstit*. If multiple agentivity operators with different temporal properties were available to the lexical semantics, we would predict a far less systematic correlation between agentivity and dynamicity. Thus it appears that only a single agentive operator is available to the Blackfoot lexical semantic system. An interesting question that arises is as follows: Is this single-agentivity-operator restriction a quirk of Blackfoot lexical semantics, or are other languages are similarly constrained?

Finally, I have suggested that the system for circumstantial modality that I’ve presented here can be paralleled in the epistemic domain. This can provide an account for modals with contextually-dependent strength that were problematic for available accounts. Whether such a system can be worked out in detail, and what sorts of consequences there may be for modal-temporal interactions, I leave as questions for further research.

Chapter 5

Blackfoot Conditionals

“Harry, I can’t believe it - you conjured up a patronus that drove away all those Dementors! That’s very, *very* advanced magic...”

“I knew I could do it all this time,” said Harry, “Because I’d already done it... does that make sense?”

Excerpt from *Harry Potter and the Prisoner of Azkaban*, by J. K. Rowling

This chapter addresses two puzzles associated with conditional constructions in Blackfoot. The first puzzle has to do with the restrictions on the main-clause/consequent of a conditional: why can a main-clause *áak-* and *aahkama’p-* license ontically-interpreted conditional antecedents, while a main-clause *ohkott-* fails to do so? The second puzzle deals with restrictions regarding the temporal interpretation of conditional antecedents: why can Blackfoot SUBJUNCTIVE conditional antecedents be interpreted as present and future, but not as past?

I argue that the first puzzle is actually a predicted consequence of the analysis proposed for the ability *ohkott-* in chapter 4 - namely that the formulation of *ohkott-*’s agentivity condition results in *ohkott-* only being compatible with a perfective temporal orientation. This temporal orientation is incompatible with a conceptually-motivated requirement whereby the cause-describing conditional antecedent must precede the consequence-describing consequent.

I argue that the second puzzle follows from an assumption that the analysis for the first puzzle requires - namely, that SUBJUNCTIVE conditional antecedents in Blackfoot are temporally evaluated with respect to the consequent modal’s temporal perspective time. This, in conjunction with our previous assumptions about Blackfoot tense (namely, that Blackfoot’s present tense is instantaneous), derives the temporal restrictions observed.

This chapter is organized into four parts. Section 5.1 introduces some basic theoretical terminology that will be useful when discussing conditionals, and then introduces the basic morphological properties of Blackfoot conditionals. Section 5.2 discusses the puzzle regarding the licensing of ontic conditionals. Section 5.3 discusses the puzzle about the temporal restrictions on SUBJUNCTIVE conditional antecedents. Section 5.4 summarizes and concludes.

5.1 Introducing Conditionals

5.1.1 Some Useful Theoretical Notions

In this section I discuss some theoretical notions regarding conditionals that will be useful when discussing the Blackfoot conditionals (the ontic/evidential/relevance distinction). I will also discuss some highly influential theoretical notions regarding English conditionals that are not very useful for describing Blackfoot conditionals - i.e., the indicative/subjunctive distinction. Although this distinction isn't very useful for describing Blackfoot, the contexts of use associated with the English indicative/subjunctive distinction provide an interesting contrast to the contexts of use associated with various conditional constructions in Blackfoot. This section is thus meant to review some relevant concepts, introduce some new concepts, and in general, establish the particular terminological conventions I adopt.

Antecedent and Consequent

We can review the basic question: what is a conditional? I adopt a definition where a conditional is a biclausal structure, consisting of an antecedent (or "if" clause) and a consequent (or "then"/main clause). These are also known as the protasis and apodosis respectively. In what follows, I will use the terms antecedent and consequent, or if-clause and main-clause interchangeably. Because I do not deal with other kinds of subordinate clauses in this dissertation (e.g., complement clauses, adjunct clauses), any 'main-clause' I refer to will also be a 'consequent.'

(251) **Conditional Structure:** If r , (then) q

r = **antecedent** (if-clause, protasis)

q = **consequent** (main/then-clause, apodosis)

Ontic, Evidential and Relevance Conditionals

A useful theoretical distinction can be made regarding the kind of relationship that holds between the antecedent and consequent. I follow Sweetser (1991), Dancygier (1998), Dancygier & Sweetser (2005) in identifying these three distinct ways that conditionals can be categorized according to the relationship between antecedent and consequent:

(252) Semantic Categories of Conditionals: In terms of $\mathbf{R}(r,q)$

1. **Ontic Conditionals**

(The if-clause describes a situation that causes, or is necessary for, the main clause to arise)

2. **Evidential Conditionals**

(The if-clause describes a situation that acts as evidence for the truth of the main clause)

3. Relevance Conditionals

(The if-clause describes a situation in which the information provided by the main clause is relevant)

Although I use different terms than the above cited works, the categories of conditional reasoning I refer to correlate with the cognitive domains they identify: Dancygier (1998)'s **content**, **epistemic** and **speech act** domains map onto my ontic, evidential and relevance relations respectively. The difference between ontic and evidential conditionals has been observed by various other researchers: Veltman (2005) and Schulz (2008) use the terms 'ontic' and 'epistemic,' while Copley (2009) uses the terms 'causal' and 'indication' to refer to what I call 'ontic' and 'evidential' conditionals respectively. Kratzer (1986) also distinguishes a unique kind of conditional that she analyzes as involving a covert epistemic necessity modal, which appears to correlate with the category of evidential conditional that Sweetser (1991), Dancygier (1998), Dancygier & Sweetser (2005) identify. The identification of a separate category of relevance conditionals (also known as 'biscuit' conditionals) has also long been observed (cf. Austin (1961), DeRose & Grandy (1999), and references in von Fintel (2012)). This three-way distinction is useful in discussing the Blackfoot data I will discuss: in sections 5.2 and 5.3 we will observe that although the difference between ontic/evidential/relevance conditionals is not marked morphologically, it nonetheless has semantic consequences in terms of (i) what sort of main-clause modal is required to license the conditional antecedent (section 5.2) , and (ii) how conditional antecedents can be interpreted temporally (5.3). The generalisations I discuss hold for the ontic conditionals, but not for the evidential or relevance conditionals.

The reader should be made aware, however, that while a distinction between these types of conditionals is accepted in the literature, the particular identifying characteristics of causal/ontic vs evidential conditionals are not often made explicit. This is true for both previous research, and the research I present here. The lack of explicitly presented identifying characteristics means that it is not always clear what a researcher would categorize as an epistemic conditional vs causal conditional. For instance, I assume that one can only have evidence for an event that is occurring, or has occurred, and that there is no such thing as evidence for a future event. Evidence for a future event is actually evidence of present momentum/designs/plans/commitments/etc. Thus I would not categorize any conditional where the antecedent temporally precedes the consequent as an evidential conditional, even if the consequent contains an epistemic modal. I am unaware as to whether the cited works have similarly strict requirements in terms of categorizing a conditional as "epistemic." Laying out explicit identifying characteristics for the different kinds of conditionals is an important objective; it is an important endeavour I leave, however, for future research.

Indicative and Subjunctive Conditionals

Another theoretical distinction used to categorize different kinds of conditionals (particularly in English) was mentioned previously in chapter 3: this is the indicative/subjunctive distinction. This distinction is less useful in describing the Blackfoot data than the previous distinction, primarily because its definitions are based on English-specific morphological and semantic categories. Because the terms indicative/subjunctive are very widespread in the linguistic literature, however, a lack of discussion would be remiss.¹³⁸

The majority of the linguistic literature defines the indicative/subjunctive with morphosemantic criteria - i.e., one must look at both the form and meaning of a conditional in order to determine if it is indicative or subjunctive. A conditional is labelled subjunctive when its antecedent has past tense morphology that doesn't correlate with a past tense interpretation. Thus (253a), which morphologically contains a simple past antecedent, but semantically is future (hence the appropriateness of the *tomorrow* adverbial), is a subjunctive conditional. (253b) and (253c), on the other hand, do not fit the morphosemantic criteria of being subjunctive and are labelled indicative: (253b) has the required morphological past tense marking but fails to pair this with a non-past semantics; (253c) lacks the required morphological past tense marking at all.

- (253) a. If Tom **broke** his leg tomorrow, they would stop at an inn.
b. If Tom **broke** his leg yesterday, they will have stopped at an inn.
c. If Tom **breaks** his leg tomorrow, they will stop at an inn.

As mentioned in chapter 3, the general semantic consequence that the literature associates with the indicative/subjunctive distinction is one of epistemic uncertainty vs counterfactuality respectively - i.e., in general, indicative conditional antecedents are subject to epistemic uncertainty (the antecedent, *r*, is possible), while subjunctive conditional antecedents are, in general, unlikely or counterfactual.¹³⁹ The form-meaning mismatch used to identify a subjunctive conditional is thus often subject to stricter criteria: a subjunctive conditional contains a simple past that lacks a past tense meaning, where the simple past, instead of conveying a lack of identity between the reference time and utterance time, conveys a lack of identity between the evaluation world and the utterance world (cf. Palmer (1986, 2001), Iatridou (2000).)

The morphosemantic approach to the indicative/subjunctive distinction is subject to further variation in terms of the range of morphological constructions that are categorized as subjunctive.

138. von Stechow (2012) notes that the indicative/subjunctive terminology is "linguistically inept" but "so deeply entrenched" in the linguistic literature that "it would be foolish not to use it." Unlike von Stechow (2012), however, I am looking at Blackfoot conditionals as opposed to English conditionals, and hope to get away with merely discussing, as opposed to using, the indicative/subjunctive distinction.

139. Recall that in chapter 3, when discussing Ippolito (2003), I mentioned the famous Anderson (1951) arsenic cases, where a subjunctive conditional does not convey either unlikelihood or counterfactuality.

The form in (253b) is a simple past, but the *were* + *infinitive* construction in (254a) and (254b), and the past perfect form in (255a) and (255b) are also often categorized as subjunctive conditionals.

(254) *were* + *infinitive* Conditionals

- a. If Tom **were to break** his leg tomorrow, they would stop at an inn.
- b. If Tom **were to have broken** his leg yesterday, they would have stopped at an inn.

(255) Past Perfect Conditionals

- a. If Tom **had broken** his leg tomorrow (instead of having broken it yesterday), they would have been close enough to London to see a doctor.
- b. If Tom **had broken** his leg yesterday, they would have stopped at an inn.

The similarity to (253a) is that all three of these constructions have putative past-tense morphology (*broke*, *were* and *had*) that seem to lack the canonical past tense semantics, as per Palmer (1986, 2001) and Iatridou (2000)'s observations. The semantic contexts in which forms like (253a), (254) and (255) can be used, however, are not identical, and lumping these all under a morphosemantic category of "subjunctive" may suggest a greater semantic similarity between these constructions than is actually present. For example, both Ippolito (2003) and Arregui (2007) look at conditionals with *would* in their consequent as a particular category of conditional, and semantically/pragmatically contrast two sub-types of these: *would* conditionals with simple past antecedents like (253a) and *would* conditionals with (past) perfect antecedents like (255).¹⁴⁰ The general observation is that the difference in form correlates with different degrees of speaker commitment towards the improbability/counterfactuality of the antecedent. While simple past "subjunctive" conditionals like (253a) only convey improbability, past perfect forms like (255) are associated with a strong implicature of counterfactuality.^{141,142}

Given this discussion, the most obvious reason why the indicative/ subjunctive distinction is not particularly useful when describing Blackfoot is that the indicative/subjunctive distinction is defined in terms of English morphological categories which do not have direct analogues in Blackfoot: The main morphosemantic indicator of a subjunctive conditional is the presence of past

140. As mentioned in chapter 3, Ippolito (2003) actually focuses more on the difference between (255a) and (255b).

141. The literature on this distinction between improbability and counterfactuality focuses on the morphological form of the antecedent, as opposed to the morphological form of the consequent. For instance, neither Ippolito (2003) nor Arregui (2007) address the fact that the conditionals with (past) perfect antecedents which they discuss also contain a (past) perfect *would have* in the consequent, while the simple past cases simply contain *would*. This is interesting because in my dialect of English, at least, I allow simple past antecedents with *would have* consequents, and the resulting constructions pattern semantically like the past perfect antecedents with *would have* consequents rather than the simple past antecedents with *would* consequents.

142. There is also often variation in terms of what a researcher means by the term "counterfactual." Some use the term to describe anything that is not known to be factual (e.g., future claims, modal claims, uncertain claims), while others use it only for things that are known to be false/non-factual. I prefer the latter definition of counterfactual.

tense morphology with the absence of a canonical past tense meaning. Blackfoot, however, has no overt tense morphology! Secondly, while Blackfoot does distinguish two morphologically-defined categories of conditionals (see next section), the pragmatic/semantic reflexes of this distinction do not quite map 1:1 onto the broad pragmatic/semantic reflexes of the indicative/subjunctive distinction.

This is important to keep in mind - when I refer to SUBJUNCTIVE Blackfoot conditionals, I do not refer to the aforementioned indicative/subjunctive distinction so prevalent in the linguistic literature on English conditionals! Rather, as discussed in chapter 2, I refer to conditionals where the antecedent is marked with a particular kind of clause-type morphology. Indeed, we will see that Blackfoot SUBJUNCTIVE conditionals are used in almost the same contexts where English ‘indicative’ conditionals are used, while Blackfoot UNREAL conditionals are used in almost the same contexts where the (subjunctive) English past perfect and *were*+infinitival-conditionals are used. To avoid confusion, I use small caps ‘SUBJUNCTIVE’ to refer to the Blackfoot morphological category, and normal small case letters ‘subjunctive’ to refer to the English morphosemantic category.

5.1.2 Two Kinds of Conditionals in Blackfoot

Morphologically, there are two kinds of conditional constructions in Blackfoot - I refer to these as SUBJUNCTIVE and UNREAL conditionals. The terms SUBJUNCTIVE and UNREAL refer to the type of clause-type morphology that the antecedent takes - SUBJUNCTIVE antecedents take SUBJUNCTIVE morphology, and UNREAL antecedents take UNREAL morphology. A SUBJUNCTIVE conditional is illustrated in (256).

- (256) *kamsaykamo'saatáiniki* *oma* *apasstaaminaam*
kam-sa-ikamo'saat-a-**iniki** om-wa apasstaaminaam
if-NEG-steal.VTA-LOC:1-**SBJ**:1/2 DEM-3 apple
nókowaan *áakitomatapohtako*
n-okowaan **áak**-it-omatap-ohtako-wa
1-stomach **FUT**-rl-start-sound.VAI-3

‘If I **don't** steal that apple, my stomach **will** start sounding.’

SUBJUNCTIVE conditional antecedents in Blackfoot are morphologically complex: they are characterized by the presence of a preverbal morpheme that my consultant consistently produces as *kam-*, as well as SUBJUNCTIVE clause-type morphology which inflects for the person of the arguments.¹⁴³ Thus SUBJUNCTIVE clause-type morphology takes the form of *-iniki* when the subject of the clause is 1st or 2nd person (as in (256)), and *-si* when the subject of the clause is 3rd person.¹⁴⁴ An UNREAL conditional is shown in (257).

143. Frantz (2009) lists the form of the preverbal morpheme in conditionals as *ikkam-*, as opposed to *kam-*.

144. Recall that SUBJUNCTIVE morphology is only used in a few other constructions: future *when*-clauses, *whenever*-clauses and embedded Y/N questions (which are morphologically identical to SUBJUNCTIVE conditional antecedents).

(257) *nitsísaykamo'saata'ohtopi* *oma* *apasstaaminaam*
nit-ii-sa-ikamo'saat-a-ohtopi *om-wa* *apasstaaminaam*
 1-ic-NEG-steal.VTA-LOC:1-UNR DEM-3 apple

nókowaan *áakitomatapohtako*
 n-okowaan **áak-it-omatap-ohtako-wa**
 1-stomach FUT-rl-start-sound.VAI-3

'If I **hadn't** stolen that apple, my stomach **would have** started sounding.'

UNREAL conditional antecedents take the person prefixes associated with the INDEPENDENT clause-type, as well as UNREAL clause-type morphology (which doesn't inflect for person/number). This is the *-htopi* morphology seen at the right-edge of the antecedent verbal complex in (257). Note that the consequents of the two types of conditionals are morphologically identical - they take the form of an INDEPENDENT clause.

As suggested by the translations given for (256) and (257), SUBJUNCTIVE and UNREAL conditionals are usually used in the contexts that English indicative and English past-perfect subjunctive conditionals are used respectively. There is not, however, a 1:1 correlation between the Black-foot SUBJUNCTIVE / UNREAL and the English indicative/subjunctive distinction, as will be discussed further in this chapter.

5.1.3 Incorporating Conditionals into our Framework

I will adopt the basic Kratzer (1981, 2012)-style approach to conditionals whereby a conditional antecedent, *r*, acts to restrict a modal in the consequent. Recall that Portner (2009) represents this as in (258), where an unmodified modal claim has the truth-conditions in (258a), and a conditionally-modified modal claim has the truth-conditions in (258b). They differ in that while (258a) has a modal base function, *f*, that considers worlds consistent with the facts in *w*, (258b) has a modal base function *f*⁺ that only considers worlds that are consistent with (i) the facts in *w* and (ii) *r* being true.

(258) Conditional Restriction on Modals

- a. $\llbracket MOD p \rrbracket^{h,c} = 1$ iff
 $\forall w' \in MAX_{g(w)}(\cap f(w)) [p(w')]$
- b. $\llbracket if r, MOD p \rrbracket^{h,c} = 1$ iff
 $\forall w' \in MAX_{g(w)}(\cap f^+(w)) [p(w')]$
 Where $f^+ = f(w) \cup \{r\}$

Given the modal denotations proposed in the previous chapter, we can implement an analogous modification for conditionally-modified modals as follows. Recall that the proposed denotations

for the modals *áak*-“will”, *aahkama’p*-“might”, *ohkott*-“able” follow a template as follows, where Q_1 and Q_1 stand in for \exists or \forall depending on the modal:

$$(259) \quad \llbracket MOD \rrbracket^{h,c} = \lambda P. \lambda t. \lambda x. \lambda w. Q_1 a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\ \llbracket Q_2 w' [R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)} \rightarrow P(t, x, w')] \rrbracket$$

Given this sort of template, we can posit a function C^+ analogous to f^+ , where C^+ is defined as in (260). Notice that the definition of C^+ is more complicated than the one provided in (258). This is because the conditional restriction presented in (258) abstracts away from the possibility that the antecedent is counterfactual - i.e., if the proposition denoted by the antecedent is one that is known to not hold true in the evaluation world. If the antecedent is counterfactual, the set of worlds compatible with both (i) the facts in w_0 , and (ii) the antecedent will correspond to the empty set \emptyset . The domain of quantification for a counterfactual conditional, however, should not be the empty set. For this reason, the definition for C^+ provided refers to Y , a consistent subset of the union of the antecedent and modal base. However, because a consistent subset can only be defined in terms of propositions, not temporally-indeterminate propositions, I have introduced the convention $Y(t)$, which represents the set of temporally-indeterminate propositions in Y , where each of these temporally-indeterminate propositions, y , are interpreted with respect to the same time variable as the modal base C .

$$(260) \quad \text{Let } Y(t) = \{y(t) | y \in Y\}$$

$$C^+ =$$

$$\lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda t. \lambda x. \lambda w. \{Y | Y \subseteq C(x, w, t) \cup \{r(t)\} \& r(t) \in Y \& \cap Y(t) \neq \emptyset \& \neg \exists X [X \subseteq C(x, w, t) \& r(t) \in X \& \cap X(t) \neq \emptyset \& Y \subset X]\}$$

$C^+(r, x, w, t)$ yields a set of sets of temporally-indeterminate propositions interpreted with respect to t , such that each set of temporally-indeterminate propositions, Y , in $C^+(r, x, w, t)$ is such that

1. Y is a subset of the union of $C(x, w, t)$ and $\{r(t)\}$ $Y \subseteq C(x, w, t) \cup \{r(t)\}$
2. Y contains $r(t)$ $r(t) \in Y$
3. Y is consistent (i.e., does not contain contradictory propositions) $\cap Y(t) \neq \emptyset$
4. There is no r -consistent subset of $C(x, w, t)$, X , that properly contains Y . $\neg \exists X [X \subseteq C(x, w, t) \& r(t) \in X \& \cap X(t) \neq \emptyset \& Y \subset X]$

The function can be broken down as follows: C^+ selects the same kinds of arguments as C , in addition to taking the conditional antecedent, r , (a **TEMPORALLY-INDETERMINATE PROPOSITION** of type $\langle i, \langle s, t \rangle \rangle$) as an argument, and yields the set of maximal r -consistent subsets in the union of C

and p. The circumstantial restriction in the modal template below has been reformulated so that the worlds in the modal's domain of quantification must be compatible with all of these r-consistent subsets. The conditional restriction presented in (260) specifies that we are not quantifying over worlds compatible with the set of propositions $C(x,w,t) \cup \{r(t)\}$, but rather with consistent subsets of that set. This avoids having an empty domain of quantification. Secondly, each subset of propositions considered must contain the antecedent, $r(t)$, because otherwise the truth-conditions would allow the reasoner to discount the conditional restriction. Thirdly, each subset must be maximal to avoid truth-conditions wherein the reasoner only considers the antecedent restriction $r(t)$ and discounts the circumstantial restriction. These considerations reflect the Premise Semantics approach to counterfactuals (Veltman 2005).

Given the conditional restriction function in (260), a modal claim modified by a conditional antecedent must then have a semantics like (261), where universal quantification over members of $C^+(f,x,w,t)$ has been introduced.

$$(261) \quad \llbracket MOD^+ \rrbracket^{h,c} = \lambda r. \lambda P. \lambda t. \lambda x. \lambda w. \mathbf{Q}_1 a \in \mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)} \\ [\mathbf{Q}_2 w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \& w' \in \cap \{Y : Y \in C^+(r, x, w, t)_{\leq G(w,t)}\}}]]] \rightarrow P(t, x, w')]$$

In order to avoid a bifurcated analysis for modal claims on the one hand and conditionally-modified modal claims on the other hand, we can assume that the semantics in (261) holds for all modal claims; in cases where there is no overt conditional antecedent, we can posit a null tautological antecedent. $C^+(r,x,w,t)$ would then consist of a single set of consistent temporally-indeterminate propositions (assuming that $C(x,w,t)$ is not inconsistent to begin with), and the universal quantification over the singleton $C^+(r,x,w,t)$ would be trivial. Modified denotations for *áak-*, *aahkama'p-* and *ohkott-* are provided below.

$$(262) \quad \text{a. } \llbracket \acute{a}ak- \rrbracket^{h,c} = \lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)} \\ \forall w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \& w' \in \cap \{Y : Y \in C^+(r, x, w, t)_{\leq G(w,t)}\}}]]] \rightarrow P(t, x, w')$$

≈ “No matter what action x takes in the given circumstances, p obtains.”

$$\text{b. } \llbracket aahkama'p- \rrbracket^{h,c} = \lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)} \\ \exists w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \& w' \in \cap \{Y : Y \in C^+(r, x, w, t)_{\leq G(w,t)}\}}]]] \& P(t, x, w')$$

≈ “There is an action open to x, such that there is a world where x takes that action in the given circumstances, and p obtains.”

$$\text{c. } \llbracket ohkott- \rrbracket^{h,c} = \lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)}$$

$$(i) \quad \forall w' [\forall Y [R(a, x, w', t) \& w' \in \cap Y [Y \in C^+(r, x, w, t)_{\leq G(x,w,t)}]]] \rightarrow P(t, x, w') \&$$

$$(ii) \quad \exists P' [\forall x, w, t [P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]$$

≈ “There is an action open to x, such that all of the worlds where x takes that action in the given circumstances, are worlds where x brings about p.”

Note that in section 5.2, we will see that the ability modal *ohkott-* fails to license conditional antecedents. There is thus no true need to posit a revised version of *ohkott-* such that *ohkott-* can be modified by a conditional antecedent; the previous denotation for *ohkott-* accounts for the same range of data. In section 5.2.2, however, I argue that *ohkott-*'s failure to license conditional antecedents follows from its unique temporal orientation, where this temporal orientation was previously motivated in chapter 4. There is thus no reason to stipulate that *ohkott-* differs from the other circumstantial modals in terms of whether its circumstantial modal base can accommodate a conditional antecedent.

To summarize, in this section, we have incorporated a semantics for conditionals into the semantics for Blackfoot circumstantial modality originally presented in chapter 4. In terms of the table of complex types first presented in chapter 2 (Table 2.11), and repeated in chapter 4 (Table 2.11), a conditional construction is formed by incorporating a temporally-indeterminate proposition (the antecedent) into the modal base (which is a set of temporally-indeterminate propositions) of a modal in consequent clause. This consequent-clause modal takes a temporally-indeterminate property as its complement, and also yields a temporally-indeterminate property as its output. The table in 5.1 is a version of the tables 2.11 and 4.3 updated to include the type of conditional antecedents, and the type of elements in a modal base - i.e., temporally-indeterminate propositions.

5.2 Constraints on Conditional Consequents

In this section I address a basic question: in what modal contexts are Blackfoot conditionals licensed? The main observation I make is that ontic conditionals and evidential conditionals differ in terms of their licensing conditions. In particular, ontic conditional antecedents must be licensed by an overt modal element in the main clause, while evidential conditionals do not. Furthermore, the overt modal element required by ontic conditional antecedents is restricted: they can be licensed by a main clause *áak-* “will” or *aahkama’p-* “might”, but not by a main clause *ohkott-* “able,” and while the imperfective *á-* can license ontic conditional antecedents under its generic reading, it fails to license them under its in-progress reading. All cases where *ohkott-* “able” or the in-progress reading of the imperfective appear to be licensing a conditional antecedent are instances of evidential conditionals.

This section is organized as follows: I first present the data underlying the generalisations about ontic conditionals. Then I present my analysis, where I argue that the distribution of the ontic conditionals is semantically conditioned by the temporal orientation of the licensing modal element. The analysis I present is based on the intuition that only forward causation is possible:

Type	Interpretation	Technical Term	Examples
$\langle s, t \rangle$	Function from worlds to truth-values	Proposition	A Blackfoot sentence like <i>anna mai'stoo ihpiyi</i> "Mai'stoo danced" or <i>anna mai'stoo áakihpiyi</i> "Mai'stoo will dance."
$\langle e, \langle s, t \rangle \rangle$	Function from individuals to functions from worlds to truth-values	Property	What is yielded when tense applies to a temporally-indeterminate property
$\langle i, \langle s, t \rangle \rangle$	Function from times to functions from worlds to truth-values	Temporally-Indeterminate Propositions	The type elements in a modal base (circumstantial or epistemic); the type of conditional antecedents
$\langle i, \langle e, \langle s, t \rangle \rangle \rangle$	Function from times to functions from individuals to functions from worlds to truth-values	Temporally-Indeterminate Property	The type that the modals <i>áak-</i> , <i>ohkott-</i> , <i>aahkama'p-</i> , and the imperfective <i>á-</i> take as their prejacent; the type that is yielded when <i>áak-</i> , <i>ohkott-</i> , <i>aahkama'p-</i> and <i>á-</i> take prejacent; the type of stative verbs like <i>isttso'kini</i> "hungry"
$\langle l, \langle i, \langle e, \langle s, t \rangle \rangle \rangle \rangle$	A function from events to functions from times to functions from individuals to functions from worlds to truth-values	Predicate	The type of eventive verbs like <i>ihpiyi</i> "dance"

Table 5.1: Complex Types in Blackfoot: 2nd Pass

the temporal orientation must be compatible with an interpretation where the situation described by the conditional antecedent (the cause or necessary condition) temporally precedes the situation described by the main clause modal's complement (the resulting outcome). Finally, I address what appear to be counter-examples to the claim that *ohkott-* cannot license conditional antecedents, showing that all of the counter-examples are evidential conditionals.

5.2.1 The Distribution of Ontic Conditionals

The Kratzerian (Kratzer (1981, 2012)) approach to conditionals that I adopt is one where if-clauses act to restrict an operator, like a modal, in the consequent. This approach, with no further stipulations, predicts that any modal should be able to license an if-clause. In this section I show that this is not the case: ontic conditionals in Blackfoot are restricted in terms of their licensing modal. This is shown by the data in (263). The (a) and (b) examples are UNREAL conditional constructions, the (c) and (d) examples are SUBJUNCTIVE conditional constructions. All four of the conditional constructions in (263) contain the ability modal *ohkott-* in their consequent, but whereas the (a) and (c) examples additionally contain *áak-*, and are acceptable utterances, the (b) and (d) examples do not, and are not acceptable.

(263) **Context:** Last night, I was talking on the phone with my sister, and she said that she was thinking about making bread, but that maybe it was too late. We hung up before she decided on anything. Today, we're meeting for a picnic lunch, and I wonder what she is going to bring. I say:

a. *iihkiitaawohtopi napayin, áakohkotta'pistotaki po'tstákssiistsi*
iihkiitaa-ohtopi napayin, áak-ohkott-a'pistotaki-wa po'tstáksin-istsi
 bake.VAI-UNR bread, FUT-ABLE-make.VAI-3 sandwich-0PL

'If she made bread, she could have made sandwiches.'

b. # *iihkiitaawohtopi napayin, iihkotta'pistotaki po'tstákssiistsi*
iihkiitaa-ohtopi napayin, ii-ohkott-a'pistotaki-wa po'tstáksin-istsi
 bake.VAI-UNR bread, ic-ABLE-make.VAI-3 sandwich-0PL

Target: 'If she made bread, she could have made sandwiches.'

c. *kamúikaiihkiitaasi napayin, áakohkotta'pistotaki po'tstákssiistsi*
kam-ikaa-iihkiitaa-si napayin, áak-ohkott-a'pistotaki-wa po'tstáksin-istsi
 if-PERF-bake.VAI-SBJ:3 bread, FUT-ABLE-make.VAI-3 sandwich-0PL

'If she has made bread, she could have made sandwiches.'

d. # *kamúikaiihkiitaasi napayin, iihkotta'pistotaki po'tstákssiistsi*
kam-ikaa-iihkiitaa-si napayin, ii-ohkott-a'pistotaki-wa po'tstáksin-istsi
 if-PERF-bake.VAI-SBJ:3 bread, ic-ABLE-make.VAI-3 sandwich-0PL

Target: 'If she has made bread, she could have made sandwiches.'

If we take a very basic Kratzerian approach to conditionals, we do not predict this difference. Assuming that *ohkott-* is a modal, a conditional antecedent should be able to restrict its domain of quantification, as there is nothing in the theory that prevents this.¹⁴⁵ The ability attributions in (263b) and (263d) are aspectually unmarked ability attributions. The data in (264) shows that non-generic imperfective-marked instances of *ohkott-* are likewise unable to license conditional antecedents.

(264) **Context:** We realize that it's my brother's birthday, but we've all been so busy that we haven't had time to plan a party or figure out what kind of gift to get him. We don't want to let his birthday pass without doing anything, so I suggest:

kamohpommainiki owaistsi, nitáóhkottsipisatsskiit
kam-ohpommaa-iniki owaa-istsi nit-á-ohkott-pisat-ihkiitaa
 if-buy.VAI-SBJ:loc egg-0PL 1-IMPF-ABLE-fancy-bake.VAI

"If I buy eggs, I can bake a cake."

145. Notice that the English translations use *could* as opposed to *can* or *be able to*. The infelicity of *can*, at least, is also unexpected given a standard Kratzer-style analysis with no further stipulations. I briefly discuss these English issues in chapter 7, however leave the majority of the issue for further research, as the distributional properties of *can*, *could*, *be able to* and *would be able to* appear to be fairly complex, and perhaps subject to speaker variation.

This contrasts with the modals *áak-* and *aahkama'p-*. The *áak-* “will” modal is sufficient to license conditional antecedents. We saw this in combination with *ohkott-* above, with (263a) and (263c). This is shown with *áak-* alone in (265).

- (265) **Context:** When my brother was very young, his pet frog got sucked up the filter. Because he was a very sensitive child, we told him the frog went back to live with its family. Twelve years later, we figure it's safe to tell him now.
- kamsskssiniisi* *anohk* *omáánista'pihpi* *máátáakohtsikííwaatsiks*
 kam-ssksini-si anohk om-aanist-a'pii-hp-yi máát-áak-ohtsikii-waatsiksi
 if-know.VTI-SBJ:3 now 3-manner-happen.VII-CJ-0 NEG-FUT-care.about.sthg.VAI-3:nonaff.sg
- 'If he found out what happened now, he wouldn't care.'

Similarly, the “might” modal *aahkama'p-* is sufficient to license conditional antecedents. This is shown where *aahkama'p-* occurs with *ohkott-* in (266), and with *aahkama'p-* alone in (267).

- (266) **Context:** Strang and Martina's hockey team has a short bench - they were talking about getting Heather to play as ringer the last time I talked to them. Otherwise they don't have enough good players to win. I realize that their game is tomorrow, and think:
- annahk* *Heather* *kamaawaawahkaasi,*
 ann-wa-hka Heather kam-waawahkaa-si,
 DEM-3-rel Heather if-play.VAI-SBJ:3,
- aahkama'pohkottomo'tsaakiyaa*
aahkama'p-ohkott-omo'tsaaki-yi-aawa
 might-ABLE-win.VAI-3pl-DTP
- 'If Heather plays, they might be able to win.'

- (267) **Context:** When my brother was very young, his pet frog got sucked up the filter. Because he was a very sensitive child, we told him the frog went back to live with its family. Twelve years later, we figure it's safe to tell him now.
- kamsskssinisi* *anohk* *omáánista'pihpi* *aahkama'psaohtsikíí*
 kam-ssksini-si anohk om-aanist-a'pii-hp-yi aahkama'p-sa-ohtsikii
 if-know.VTI-SBJ:3 now 3-manner-happen.VII-CJ-0 might-NEG-care.about.sthg.VAI
- 'If he found out what happened now, he might not care.'

(265) and (267) are examples of SUBJUNCTIVE conditional antecedents. The data in (268) and (269) show that the same generalisation holds true for UNREAL conditionals: *áak-* or *aahkama'p-* suffice to license both of these types of conditional.

- (268) **Context:** I stole and ate my sister's apple, but failed to get rid of all of the evidence, and got busted. But I'm unrepentant:

nitsíisaykamo'saata'ohtopi *oma* *apasstaaminaam* *nókowaan*
nit-ii-sa-ikamo'saata-ohtopi om-wa apasstaaminaam n-okowaan
 1-ic-NEG-steal.VTA-UNR DEM-3 apple 1-stomach
áakitomatapohtako
áak-it-omatap-ohtako-wa
 FUT-rl-start-sound.VAI-3

'If I **hadn't** stolen that apple, my stomach would've started sounding.'

- (269) **Context:** My dad surprised my mom with a getaway weekend at a cottage. Because my mom is incurably nosy, and my dad is not the stealthiest person, we're discussing how lucky my dad was in pulling it off, because there are many ways my mom could have found out.

iisitsipssimohtopi *annisk* *naaáhs*
 ii-sitsipssat-im-htopi ann-isk n-aaahs
 ic-converse.W.VTA-??-UNR DEM-INV 1-o.reln

aahkama'pitoiskoissksinim
aahkama'p-it-ohkoissksini-m-wa
 might-rl-find.out.VTI-LOC:0-3

'If she had talked to my uncle, she might have found out.'

The next types of modal contexts I consider are imperfective contexts. Blackfoot's imperfective can be interpreted with an eventive in-progress reading, or with a habitual reading. While imperfectives are more often categorized as aspects, as opposed to modals, both in-progress and habitual readings are standardly analysed as requiring a modal semantics (Portner (1998), Deo (2009), Arregui et al. (2011), see discussion in chapter 3 and 4). We thus might expect Blackfoot's imperfective *á-* to be able to license conditional antecedents. The generalisation, however, is that while its habitual readings license conditionals, its episodic in-progress readings do not. I will show this first for imperfective-marked ability attributions, and then for otherwise non-modal imperfective claims.

(264a), repeated as (270a), shows that an imperfective-marked ability attribution, when interpreted episodically (i.e., when the speaker is assessing one's present ability to complete a particular event), cannot be modified by a causally-interpreted conditional antecedent. In order to convey the target meaning, the future modal *áak-* is required, as shown by (270b).

- (270) **Context:** We realize that it's my brother's birthday, but we've all been so busy that we haven't had time to plan a party or figure out what kind of gift to get him. We don't want to let his birthday pass without doing anything, so I suggest:

- a. # *kamohpommaainiki* *owaistsi*, *nitáóhkottsipisatsskiit*
 kam-ohpommaa-**iniki** owaa-istsi, nit-**á-ohkott**-pisat-ihkiitaa
 if-buy.VAI-**SBJ:loc** egg-0PL 1-**IMPF-ABLE**-fancy-bake.VAI
 Target: 'If I buy eggs, I can bake a cake.'
- b. *kamohpommaainiki* *owaistsi*, *nitáakohkottsipisatsskiit*
 kam-ohpommaa-**iniki** owaa-istsi, nit-**áak-ohkott**-pisat-ihkiitaa
 if-buy.VAI-**SBJ:loc** egg-0PL ,
 1-**FUT-ABLE**-fancy-bake.VAI
 'If I buy eggs, I can bake a cake.'

The same does not hold true, however, of an imperfectively-marked ability attribution that is interpreted generically. Thus the example in (271a), which is interpreted in a context where the speaker is assessing one's general ability to complete events of a certain type, is felicitously modified by a causally-interpreted conditional antecedent. (271b) shows that *áak*- can also be used in this sort of context.

(271) **Context:** My sister wants me to bake a cake for her. I'm pretty good at making cakes, so I agree. Only, I forget to buy eggs for the cake! I find a recipe for an egg-free cake, but it ends poorly. My sister is making a face as she eats the cake, and I feebly try to defend my cake making skills by saying (Target: "If I buy eggs, I can make cake.")

- a. *kamohpommaainiki* *owaistsi*, *nitáóhkott(sok)sipisatsskiit*
 kam-ohpommaa-**iniki** owaa-istsi, nit-**á-ohkott**-(sok-)pisat-ihkiitaa
 if-buy.VAI-**SBJ:loc** egg-0PL 1-**IMPF-ABLE**-(good-)fancy-bake.VAI
 "If I buy eggs, I can make (good) cakes [in general]."
- b. *kamohpommaainiki* *owaistsi*, *nitáakohkottsipisatsskiit*
 kam-ohpommaa-**iniki** owaa-istsi, nit-**áak-ohkott**-pisat-ihkiitaa
 if-buy.VAI-**SBJ:loc** egg-0PL 1-**FUT-ABLE**-fancy-bake.VAI
 'When I buy eggs, I can make cakes.'

(272) provides further examples of this contrast between the generic and episodic interpretations of the imperfective-marked ability attributions. The context is an episodic one and the imperfective-marked ability attributions are infelicitous. Furthermore, the consultant's comments regarding the constructions suggest that these sorts of constructions are preferred in generic contexts.¹⁴⁶

146. I believe that the comment my consultant makes about (272a) regarding my sister being already in the water has to do with the general felicity conditions of the episodic uses of the imperfective. In general, felicitous uses of *á*- (with ability attributions or otherwise non-modally modified claims) require that the episode/attempt in question is already in-progress. This is discussed further in chapter 6, where I show that Blackfoot's imperfective does not allow for futurate readings, even in the restricted contexts where the English progressive and simple present do allow future readings.

(272) **Context:** My siblings and I get along very well, but when it comes to games and contests, we are very competitive with each other. Every time we're all together somewhere and we see a pool, we have to have a treading-water contest. This time, however, my eldest sister is 7-months pregnant. She still wants to compete, since she is the reigning champion, but we disqualify her, on the grounds that my over-protective mom will have apoplexy. My sister acquiesces, but grumbles:

- a. ?# *kamáó'tsiiniki* *nitáóhkottomo'tsaaki*
 kam-á-otsi-**iniki** nit-á-**ohkott**-omo'tsaaki
 if-IMPf-SWim.VAI-SBJ:1 1-IMPf-ABLE-win.VAI
 'If I was swimming, I could win.'
BB: More like she's in the water, or talking about like in general
- b. # *nitáótsi'ihtopi* *nitáóhkottomo'tsaaki*
 nit-á-otsi-**htopi** nit-á-**ohkott**-omo'tsaaki
 1-IMPf-SWim.VAI-UNR 1-IMPf-ABLE-win.VAI
 'If I was swimming, I could win.'

The above generalisation also holds for (otherwise non-modal) imperfective claims. The data in (273) and (274) are both examples of a generically interpreted imperfective; in both cases, a causally-interpreted conditional antecedent is acceptable.

(273) **Context:** My mom likes to lecture me about my newborn niece.

kamáístso'kinisi, *áwaasai'ni*
 kam-á-isttso'kini-si, á-waasai'ni-wa
 if-IMPf-hungry.VAI-SBJ:3, IMPf-cry.VAI-3
 'If she gets hungry she cries.'

(274) **Context:** Whenever my baby niece is being undressed for a diaper change, for a bath, or to be weighed at the doctor's office, she pees. We think her getting cold is the common factor.

kami'níipitsisi, *áísaipioohsi*
 kam-i'niipitsi-si, á-saipiohsi-wa
 if-cold.VAI-SBJ:3, IMPf-urinate.VAI-3
 'If she gets cold, she pees.'

Contrast this with the data in (275) and (276). The data in (275) presents a context that very strongly favours a progressive interpretation of the consequent imperfective; in this context, the addition of a causally-interpreted conditional antecedent is not permitted. The context in (276) is compatible with either a progressive or generic interpretation of the imperfective; with the addition of a conditional antecedent, however, we can only get a generic interpretation.

- (275) **Context:** My uncle likes to walk everywhere, but he recently got his leg hurt when he got hit by a car. So he hasn't been walking as much lately. He's coming over for dinner, and we're not sure whether his leg is better and he's walking over, or whether he'll have to be driven over by one of his sons. My mom remarks:

kamúikaisoka'pisi *ohkatsii,* *áíksowoo*
 kam-ikaa-sok-a'pii-si o-ohkat-yi, á-iksowoo-wa
 if-PERF-good-be.VII-SBJ:3 3-leg-0, IMPF-walk.VAI-3

'If his leg is better, # he walks.'

Target: If his leg is better, he's walking.

- (276) **Context:** My sister and brother-in-law went up to one of the local mountains, where it's colder than it is at sea-level here in Vancouver, but it's often still too warm for snow in parts of the winter. It starts to rain down here at sea-level, and I remark:

annom áísootaa. *kamsstonnatsstoyisi* *miistaakiistsi,* *áóohpotaa*
 annom á-sootaa-wa. kam-sstonnat-sstoyi-si miistaaki-istsi, á-ohpotaa-wa
 DEM IMPF-rain.VAI-3. if-ints2-cold.VII-SBJ:3 mountain-0PL IMPF-snow.VII-3

'It's raining here. If the mountains are really cold, it snows (*it's snowing).'

Notice that Blackfoot's imperfective has a range of semantic meanings very similar to the English progressive. Unlike the English progressive, however, it does not appear in futurate constructions in the sense of Copley (2002, 2009). This will be discussed in more detail in chapter 6. This discussion of the in-progress and habitual readings of the imperfective thus covers its range of modal meanings. The licensing contexts for conditionals of the ontic-type are summarized in the table below: the licensing modal contexts are the future modal *áak-*, the "might" modal *aahkama'p-*, and the habitual reading of the imperfective *á-*; the non-licensing modal contexts are the ability modal *ohkott-*, and the in-progress/eventive reading of the imperfective *á-*.

(277) Licensing "if"-clauses with Modal Environments

MODAL Environment	CNSQ form	if-clause Licensed?
FUTURE	<i>áak-P</i>	✓
MIGHT	<i>aahkama'p-P</i>	✓
ABILITY	<i>ohkott-P</i>	×
IMPF _{EVENT}	<i>á-P</i>	×
IMPF _{GEN}	<i>á-P</i>	✓

5.2.2 Characterizing the Distribution of Ontic Conditionals

In what follows, I propose that the licensing and non-licensing contexts of the ontic conditionals can be semantically characterized in terms of their temporal orientation. The underlying intuition is that the temporal order of cause and effect is strictly forward - i.e., that there is no such thing as

backwards causation, wherein the effects may precede the cause. As the data in question are all cases of ontic-type conditionals, where the antecedent describes a situation that is necessary for, or causes, the consequent/main-clause to arise, we expect the following “Ontic Requirement” to hold:

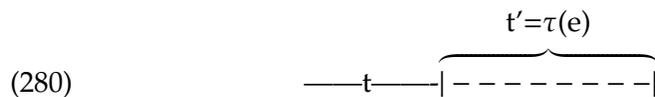
(278) **The Ontic Requirement**

$$\text{ANTC} < \text{CNSQ}$$

Recall that Condoravdi (2002) identifies temporal perspective as the time associated with the propositions in a modal’s modal base. In other words, the temporal perspective time is the time during which the propositions in the modal base hold true. Thus, a claim like “Calvin will beat the game” (279a) can be viewed as considering the facts that hold at a specific time - i.e., the utterance time. This is represented in (279b): (1)-(3) are the propositions contained within the modal base of the main clause *will*; as these are propositions that hold true of the utterance time, the temporal perspective is ‘present.’

- (279) a. Calvin **will** beat the game.
 b. MB = **at time t**, (where t = utterance time):
1. All he has left to do is beat the final boss
 2. He has three extra lives
 3. He’s figured out how to avoid the final boss’s trademark move

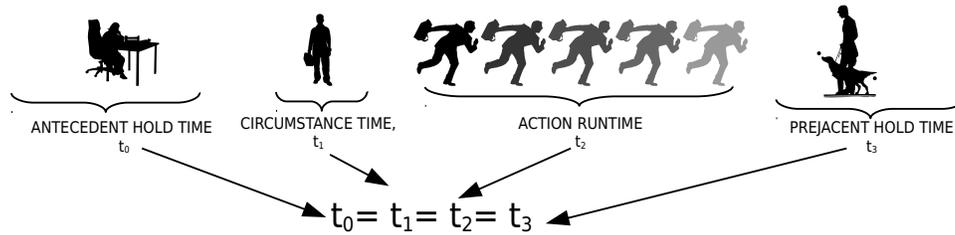
Condoravdi (2002) identifies temporal orientation as the relationship that holds between the temporal perspective time, and the event time, which is the time during which the modal’s prejacent event takes place. Because the claim in (279) is such that Calvin’s beating the game takes place at t’, some time after t, the temporal orientation is ‘future’ or ‘prospective.’ This is represented in below in (280). In what follows, I will follow Kratzer (2011) and Matthewson (2012) and use the term ‘prospective’ as opposed to ‘future.’¹⁴⁷



Recall next that under the analysis for conditionals I have been assuming, conditional antecedents are incorporated into a licensing modal’s modal base, where the modal base is a set of temporally-indeterminate propositions (i.e., $\lambda t.\lambda w.$ expressions) that are temporally interpreted with respect to a later-merging evaluation time (the temporal perspective time). As the antecedent

147. ‘Prospective’ refers to an aspectual relation - i.e., a relationship between two times, where neither of these times are deictic. I will reserve the term ‘future’ to talk about a specific type of modal, which selects for a prospective aspect.

is incorporated into such a set, it should likewise be a temporally-indeterminate proposition that, after being incorporated into the modal's modal base, is likewise interpreted with respect to the temporal perspective time.



(Where CIRCUMSTANCE TIME = Temporal Perspective Time)

Figure 5.1: Correlation of Times for a Blackfoot Circumstantial Conditional

Proposal: Temporally-Interpreting Conditional Antecedents

1. A conditionally-modified modal base contains (i) temporally-indeterminate propositions (type $\langle i, \langle s, t \rangle \rangle$) expressing the agent's circumstances in w at t , and (ii) the temporally-indeterminate antecedent proposition.
2. These are all interpreted with respect to a later-merging evaluation time (the temporal perspective time).

- ∴ 3. The conditional antecedent is a temporally interpreted with respect to the consequent modal's temporal perspective time.

This is the sort of system for incorporating conditional antecedents that I presented in section 5.1.3; and is schematized below in (281).¹⁴⁸ It should be noted that I assume the availability of a null prospective aspect in conditional antecedents, for both Blackfoot and English.¹⁴⁹ The system I propose for Blackfoot is one where the null prospective aspect is, strictly speaking, optional. However if the antecedent (a temporally-indeterminate proposition) is a bare eventive (which must hold true of an interval), and the antecedent's evaluation time is instantaneous, the antecedent must be interpreted as having first been modified by the null prospective aspect in order for the antecedent to be compatible with its instantaneous evaluation time. The assumption

148. Note that we could derive the same effect if the modal base consisted of temporally determinate propositions, if the modal base were subject to a restriction that its propositions all be interpreted with respect to the same time.

149. Kaufmann (2005) proposes a particular kind of accessibility relation for predictive conditionals, R^* , which plays the same forward-shifting temporal role as the null prospective aspect that I assume. The null prospective aspect that I assume to be available in English and Blackfoot, however, differs from Kaufmann (2005)'s R^* in that (i) it is not particular to conditional constructions, as it also provides the prospective interpretation of the complements of *will* / *áak-* and *might* / *aahkama'p-*, and (ii) it forces a prospective interpretation whereas R^* is merely compatible with a prospective interpretation.

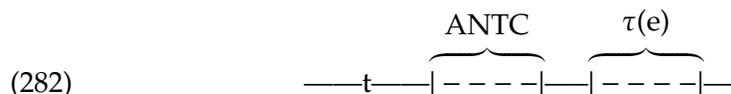
of a null prospective aspect will also be helpful for making a formalized generalisation regarding the distribution of Blackfoot *SUBJUNCTIVE* conditionals in a later part of this chapter. Consequences for assuming a null prospective aspect are addressed in chapter 6.

(281) If the power comes back on, he **will** beat the game.

MB⁺ = at time t,

1. all he has left to do is beat the final boss
2. He has three extra lives
3. He's figured out how to avoid the final boss's trademark move
4. \emptyset_{PROSP} [**The power comes back on**]

If a prospective-modified conditional antecedent is interpreted with respect to the temporal perspective time, and the antecedent describes a situation that must temporally precede the situation described by the consequent, then the temporal orientation of the modal claim must be one that is compatible with the following temporal configuration.¹⁵⁰



Note that in order for a modal to license causally-interpreted conditional antecedents, the modal's temporal orientation only has to be compatible with (282); the temporal orientation need not force the temporal configuration given in (282). As long as the antecedent situation can be interpreted as preceding the consequent situation, the antecedent situation can be interpreted as having caused (or been crucial to the causation of) the consequent situation. This allows the modal to license a *causally-interpreted* conditional antecedent. Cases where the antecedent situation does not precede the consequent situation, yet the temporal configuration of antecedent and consequent are compatible with the modal's temporal orientation, are logically possible. However in such cases, the antecedent situation cannot be interpreted as having caused (or been crucial to the causation of) the consequent situation; thus the modal, in this case, does not license a *causally-interpreted* conditional antecedent.¹⁵¹ This does not change the fact that given the correct context, the modal in question can license a causally-interpreted conditional antecedent. This contrasts with a modal whose temporal orientation is crucially incompatible with a configuration where

150. Given the (upcoming) denotation for prospective aspect in (288), the antecedent has to completely follow t (as per the diagram in (282)), and cannot overlap with it.

151. It is difficult to determine whether such conditionals exist in Blackfoot. While conditionals with *áak-* in their consequent are not always interpreted as causal/ontic conditionals - i.e., they can also be interpreted as evidential conditionals in the right context - I assume that in such cases a null epistemic modal is doing the actual conditional licensing. I have not investigated relevance conditionals in enough detail, however, to make any claims about how they are semantically constructed.

ANTC < CNSQ (as I will argue is the case for ability *ohkott-* and the in-progress reading of the imperfective *á-*). These modal elements never license causally-interpreted conditional antecedents.

I suggest that this requirement has been grammaticalized into a semantic requirement as follows, where we require the runtime of the prejacent event to completely follow the temporal perspective time, t .¹⁵²

(283) **The Ontic Requirement: Grammaticalized**

$$t < \tau(e)$$

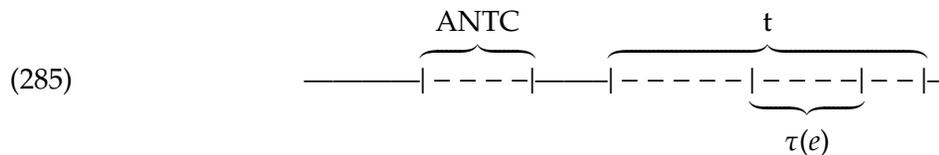
The runtime of the consequent modal's prejacent event, $\tau(e)$, must follow the consequent modal's temporal perspective time, t .

Note that this grammaticalized requirement does not perfectly map onto the core intuition of the ontic requirement, which merely requires the antecedent to precede the consequent.

(284) **The Ontic Requirement: Intuitively**

$$\text{ANTC} < \text{CNSQ}$$

Given the availability of temporal operators that can shift the temporal location of the antecedent and consequent events, we thus predict a mismatch between the formalized and intuitive forms of the ontic requirement. For instance, when the antecedent is marked with the perfect *ikaa-*, the runtime of the antecedent event will precede the temporal perspective time t . This would allow the runtime of the antecedent event to temporally precede the runtime of the consequent event, even if the temporal perspective time, t , is contained within, or contains, the runtime of the consequent event, as illustrated by the schema below.



This sort of configuration satisfies the intuitive version of the ontic requirement in (284), but not the grammaticalized version in (283). As I will discuss in the following subsections, the grammaticalized version in (283) is what rules the day; the presence of the perfect *ikaa-* in the antecedent does not allow *ohkott-*, or the in-progress reading of the imperfective *á-*, to license causally-interpreted

152. I use the term 'grammaticalized' to indicate that the restriction is purely a stipulation of the grammar, and does not exactly map onto the real-world cause-and-effect motivation. I do not mean 'grammaticalization' in the way that many linguists refer to the way that, for example, pronouns may be cliticize onto verbs and eventually be grammaticalized into agreement morphemes.

conditional antecedents.

In what follows, I go through the various modal contexts represented in the table below, arguing that the licensing of the ontic conditional antecedents correlates with the proposed kind of temporal configuration.

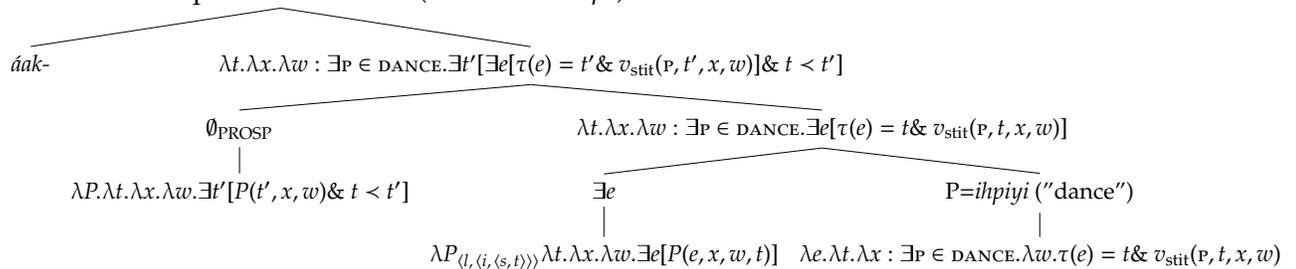
(286) Licensing "if"-clauses with Modal Environments

MODAL Environment	CNSQ	if-clause Licensed?
FUTURE	<i>áak</i> -P	✓
MIGHT	<i>aahkama'p</i> -P	✓
ABILITY	<i>ohkott</i> -P	×
IMPF _{EVENT}	<i>á</i> -P	×
IMPF _{GEN}	<i>á</i> -P	✓

Future and Prospective Temporal Orientation

I begin with the easiest case - i.e., cases where the conditional's consequent clause contains the modal *áak*- "will," and where the conditional's antecedent clause lacks both (i) overt aspectual marking and (ii) a modal.¹⁵³ I assume, as discussed in chapter 4, that eventive claims marked by the modal *áak*- "will" are systematically modified by a prospective temporal aspect; the example composition for an *áak*- claim is repeated in (287). I further assume that eventive conditional antecedents lacking overt aspect are also systematically interpreted as containing a null prospective aspect.

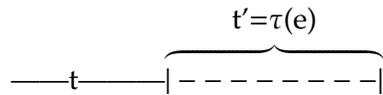
(287) Eventive Complements for *áak*- (and *aahkama'p*-)



With the sort of composition illustrated above, eventive *áak*- claims (both those modified with a conditional antecedent and those that are not) make an assertion based on facts at time *t*, and assert that there is some *P*-event that occurs after *t*. This is represented by the denotation of prospective aspect given below.

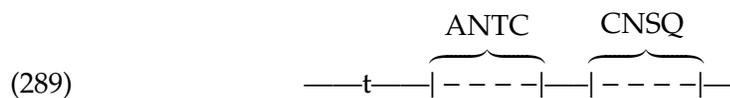
153. Blackfoot conditional antecedents do not require modal marking. Modals can appear in the antecedent of a conditional, however these have a distinct semantic flavour which I discuss in chapter 6.

$$(288) \quad \llbracket \emptyset_{\text{PROSP}} \rrbracket^{\text{h,c}} = \lambda P. \lambda t. \lambda x. \lambda w. \exists t' [P(t', x, w) \& t < t']$$



ANTC < CNSQ? ✓
 t < τ(e) ✓

The relevant part of the denotation is the temporal orientation, encoded as $t < t'$. This means that a conditional whose antecedent is licensed by *áak-* will be compatible with the temporal configuration that I have argued is required for the felicitous licensing of an ontic-type conditional (repeated in (289)). Correlatingly, as seen in the previous section, the “will” modal *áak-* can license ontic-type conditional antecedents.

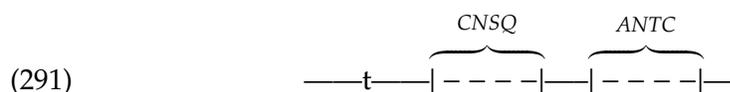


As I similarly assume that the modal *aahkama'p-* requires its eventive prejacent to be modified by a null prospective aspect (see chapter 4 for this claim, and chapter 6 for the empirical basis of this claim), we expect, as seen in the previous section, that *aahkama'p-* can likewise license ontic-type conditional antecedents.

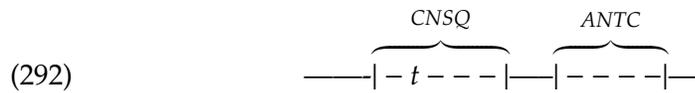
(290)

Modal	Licenses if-r?	Compatible with $t < \tau(e)$?
<i>áak-</i>	✓	✓
<i>aahkama'p-</i>	✓	✓

One thing to note is that modal *áak-* does not force the temporal configuration illustrated in (289). For instance, the presence of prospective aspect on the consequent modal's prejacent does not force a configuration where the antecedent precedes the consequent. If both the antecedent and consequent are temporally-indeterminate propositions modified by the null prospective aspect, all that is required by the truth-conditions of the derivation is that the antecedent and consequent event follow the temporal perspective time, t . It does not state anything about the temporal relationship that holds between antecedent and consequent relative to each other. Thus we predict a temporal configuration like 291) to be possible.



Secondly, if *áak-* has a stative or imperfectives prejacent, then the consequent clause's prejacent (a temporally-indeterminate property) is asserted to overlap with the temporal perspective time, as illustrated in (292).



There are thus temporal configurations that are compatible with the truth-conditions imposed by *áak-*, yet incompatible with the Ontic Requirement. The availability of these two additional temporal configurations predicts that the presence of *áak-* in the consequent of a conditional will not force an ontic interpretation. This appears to be the case; the conditional below has *áak-* in the consequent, but the antecedent does not describe a situation that is necessary for, or causes, the situation described by the antecedent. Rather, the antecedent describes (mounting) evidence for the truth of the antecedent - i.e., (293) is an evidential conditional, not a causal/ontic conditional, despite the presence of *áak-* in the consequent.

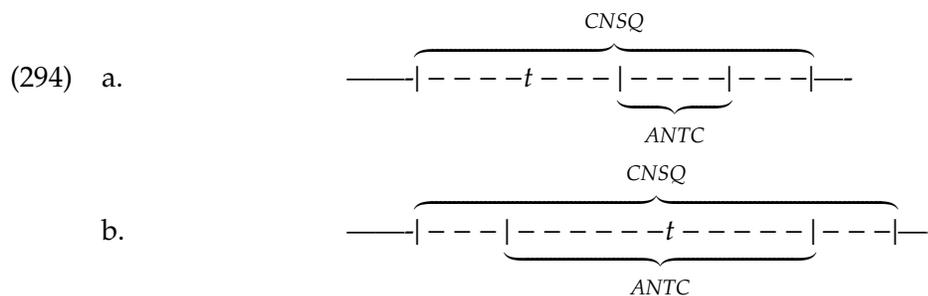
- (293) **Context:** I suspect that the deck of cards in front of me is rigged, so that they're all red. But I'll turn over one last card before making my conclusion.

amo kaahtsa'tsii kamomáóksinattsisi
amo kaahtsa'tsi-yi kam-omaohksinattsi-si
 DEM card-0 if-red.VII-SBJ:3

áakohkanomaohksinattsiyaa
áak-ohkana-omaohksinattsi-yi-aawa
 FUT-all-red.VII-3pl-DTP

'If that card is red, they will all be red.'

The temporal configuration associated with the example in (293) can be analyzed as a variation of (292), where the consequent overlaps with *t*, but (being the individual-level stative *ohkanaomaohksinattsi* "all be red"), also holds true beyond the time associated with the discovery of redness expressed by the antecedent. This is represented in (294a), where the antecedent (also stative *omaohksinattsi* "be red") is interpreted as episodic discovery (e.g., the card "turns out" to be red); this episodic reading means the antecedent must have been modified by a null prospective aspect. (293) could also be analyzed as in (294b), however, where the antecedent (*omaohksinattsi* "be red") is interpreted as stative, and thus not (necessarily) having been modified by null prospective aspect.



In either case, we can conclude that a modal (like *áak-*) doesn't force a temporal configuration such that ANTC < CNSQ. Thus forcing a temporal configuration like ANTC < CNSQ is not a necessary condition in order for a modal to be able to license causally-interpreted conditional antecedents.

The Ability Modal's Temporal Orientation

Next consider the logically possible (but empirically unattested) construction wherein the ability modal *ohkott-* licenses a conditional antecedent. Recall the Brown (1988) and Horty (2001) inspired denotation for Blackfoot's ability modal *ohkott-*, given below.

(295) The Ability Modal *ohkott-*

$$\llbracket ohkott- \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$$

- (i) $\forall w' [\forall Y [R(a, x, w', t) \& w' \in \cap Y [Y \in C^+(x, w, t)_{\leq G(x, w, t)}]] \rightarrow P(t, x, w')] \&$
- (ii) $\exists P' [\forall x, w, t [P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]$

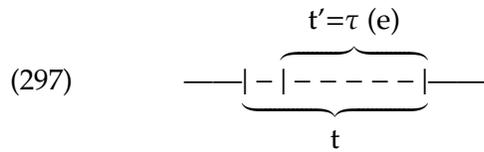
\approx "There is an action open to x , such that all of the worlds where x takes that action in the given circumstances, are worlds where x brings about P ."

A crucial part of the denotation is the requirement in (ii), which states (following Horty (2001) and Horty & Belnap (1995)) that ability modals like *ohkott-* require their complements to be agentive. Recall that given the denotation I have proposed for v_{STIT} , repeated below in (296), the denotation for *ohkott-* is only logically compatible with a temporal orientation where the runtime of the prejacent event is contained within the modal's λt variable (i.e., a perfective temporal orientation).

(296) $\llbracket v_{\text{stit}} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda x. \lambda w. \exists a [R(a, x, w, t) \&$

- (i) $\forall w' [R(a, x, w', t) \rightarrow P(\text{fin}(t), x, w')] \tag{Positive Condition}$
- (ii) $\exists w'' [\neg R(a, x, w'', t) \& \neg P(\text{fin}(t), x, w'')] \tag{Negative Condition}$

The reasoning was as follows: according to v_{STIT} 's positive condition, the final bound of the λt variable is the instant where we need to make sure that the truth of P is guaranteed (in the relevant action worlds). P is a simple temporal predicate that holds true of all of the times after a particular event. This means that this event must be realized prior to the temporal variable's final bound. At the same time, according to v_{STIT} 's negative condition, there must be a world/history accessible from the initial bound where P is false. This means the event cannot be realized before the initial bound. Taken together, this means that *ohkott-*'s prejacent event must be contained within *ohkott-*'s temporal perspective time, such as in the following schema:



The temporal configuration represented in (297) is driven by (i) the agentivity requirement associated with *ohkott-*, and (ii) the particular formalization of the STIT operator I have adopted (where the formalization is independently motivated by the temporal behaviour of agentive predicates in Blackfoot). However, the temporal configuration in (297), whereby the endpoint of the preajcent event correlates with the endpoint of the temporal perspective time, also reflects the intuition that the relevant interval during which we consider the evaluation world's circumstances correlates with the runtime of the possible action that ensures the preajcent event's successful completion. As circumstances that arise during the run-time of the preajcent event could affect whether or not the agent in question is able to complete the event, it seems natural to assume that the modal's temporal perspective time contains the runtime of the preajcent event.

What about the relation between the runtime of *ohkott-*'s preajcent event and the initial bound of t ? Recall that I have proposed that a circumstantial modal's temporal perspective time, t , in Blackfoot, correlates with the runtime of the event instantiating the action that modal quantifies over.¹⁵⁴ In the case of ability *ohkott-*, this means that the event-instantiation of the action that the agent takes to guarantee her seeing-to-the realization of the consequent's preajcent event must begin at the initial point of t . Assuming that the action the agent takes to guarantee her seeing-to-it-that-P is the same action the agent takes to see-to-it-that-P, the consequent's preajcent event must begin at (or very close to) the initial point of t . Thus even though the schema in (297) represents the consequent's preajcent event being *properly* contained within the temporal perspective time, the correlation between (i) the action that the agent takes to guarantee that she sees-to-it-that-P and (ii) the action that the agent takes to see-to-it-that-P, effectively makes it so that the runtime of the event instantiating (i) correlates with the runtime of the event instantiating (ii) - i.e., the consequent's preajcent event. The runtime of the consequent's preajcent event, t' , thus begins either at, or very close to, the initial point of t . This leaves very little room for the runtime of the antecedent event to (i) similarly be contained within t , and (ii) precede the runtime of the consequent event in order to satisfy the ontic requirement. Correlatingly, as we saw in the previous section, the ability modal cannot license ontic-type conditional antecedents.

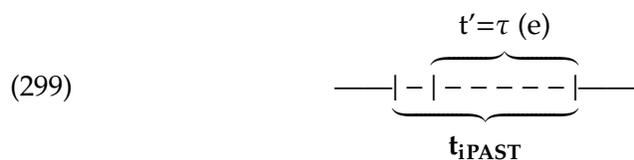
Recall the examples showing that *ohkott-* fails to license causally-interpreted conditional antecedents, repeated below in (298).

154. In cases where there are multiple actions - i.e., cases where we universally quantify over actions - I suggest that the modal's temporal perspective time correlates with the average runtime of the events that instantiate the actions.

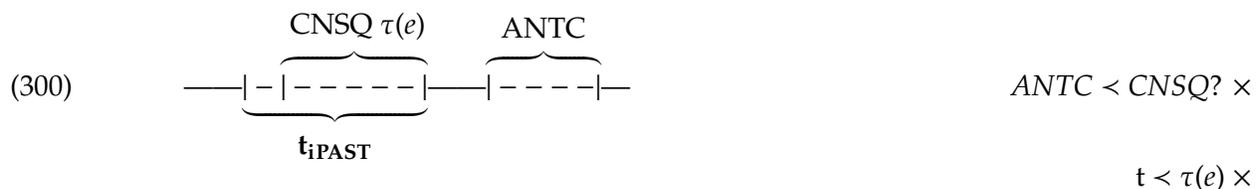
(298) **Context:** Last night, I was talking on the phone with my sister, and she said that she was thinking about making bread, but that maybe it was too late. We hung up before she decided on anything. Today, we're meeting for a picnic lunch, and I wonder what she is going to bring. I say:

- a. # *iihkiitaawohtopi* *napayin*, *iihkotta'pistotaki* *po'tstákssiistsi*
iihkiitaa-ohotopi *napayin*, *ii-ohkott-a'pistotaki-wa* *po'tstáksin-istsi*
 bake.VAI-UNR bread, ic-ABLE-make.VAI-3 sandwich-0PL
 Target: 'If she made bread, she could have made sandwiches.'
- b. # *kamíikaiihkiitaasi* *napayin*, *iihkotta'pistotaki* *po'tstákssiistsi*
kam-ikaa-iihkiitaa-si *napayin*, *ii-ohkott-a'pistotaki-wa* *po'tstáksin-istsi*
 if-PERF-bake.VAI-SBJ:3 bread, ic-ABLE-make.VAI-3 sandwich-0PL
 Target: 'If she has made bread, she could have made sandwiches.'

Examples (298a) and (298b) are cases where the consequent *ohkott*'s temporal perspective time is interpreted as a past interval. According to the analysis proposed in chapter 4, *ohkott*- requires a perfective temporal orientation - i.e., the runtime of the consequent event (sandwich-making) must be contained within this past temporal perspective time, but this containment is a close fit, as illustrated in (299). (298a) and (298b) differ in terms of (i) their antecedent's clause-type morphology and (ii) their antecedent's aspectual marking. As temporality is the issue at hand here, I will focus on the differences in aspectual marking, discussing first (298a) and then (298b).

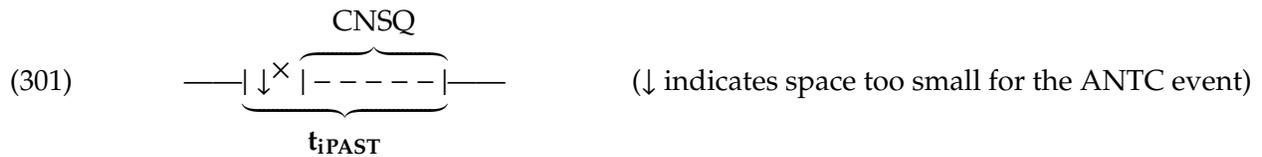


In (298a), the antecedent event (bread-baking) is a bare eventive. In the system for Blackfoot temporality laid out in chapters 2 and 4, this allows for two logical possibilities: The first option is one where the antecedent's bare eventive is a temporally-indeterminate proposition that contains a null prospective aspect. The second option is one where the antecedent's bare eventive is a temporally-indeterminate proposition that contains a null perfective aspect. If the antecedent's bare eventive is interpreted as having been modified by a null prospective aspect, we would derive the problematic temporal configuration in (300), where the antecedent event follows, as opposed to precedes, the consequent event. This is incompatible with the ontic requirement.



What if the antecedent's bare eventive is interpreted as having been modified by a null perfective aspect - i.e., where the truth-conditions are such that the sandwich-making event must be

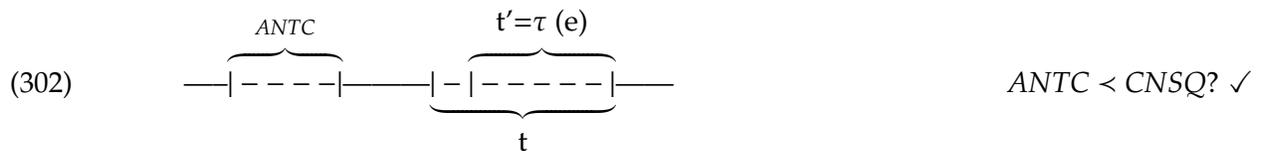
contained within the temporal perspective time t_{iPAST} ?¹⁵⁵ Given the discussion above, the action the agent does to guarantee the completion of the ‘making sandwiches’ event begins at the initial point of t_{iPAST} . This means that although the t_{iPAST} only need *contain* the sandwich-making event, the correlation of the temporal perspective time (t_{iPAST} in this case) and the runtime of the action’s instantiation make it so that t_{iPAST} very nearly (or even completely) correlates with the runtime of the sandwich-making event. This allows little time for the antecedent (bread-baking) event to be contained within t_{iPAST} so that the antecedent event completely precedes the consequent event, as required by the causal/ontic requirement. Thus we derive the unsuitability of (298a), whether the antecedent is interpreted as having been modified by perfective or by prospective aspect.



$$ANTC < CNSQ? \times$$

$$t < \tau(e) \times$$

In (298b), on the other hand, the antecedent’s eventive is marked with the perfect *ikaa*-.¹⁵⁶ The infelicity of (298b) thus appears surprising. Under the assumption that the perfect *ikaa*- shifts the runtime of the antecedent event to some time preceding the temporal perspective time, we derive a temporal configuration like (302), wherein the intuitive form of the ontic requirement (i.e., that $ANTC < CNSQ$) is satisfied.



$$ANTC < CNSQ? \checkmark$$

$$t < \tau(e) \times$$

This is the previously mentioned mismatch, wherein the intuitive and grammaticalized form of the ontic requirement make different predictions regarding the felicity of the conditional construction. The infelicity of (298b) suggests that the intuitive form of the ontic requirement is not enough, and that the stricter, grammaticalized version of the ontic requirement (i.e., that $t < \tau(e)$) is required.

155. The antecedent in (298a) is marked with UNREAL morphology. In the second part of this chapter, I show that UNREAL antecedents can be interpreted with either perfective or prospective aspect. As I will show in the second part of this chapter, however, the non-counterfactual status of the antecedent in (298a) would restrict the antecedent in (298a) to having a perfective, as opposed to prospective interpretation. Thus while both prospective and perfective interpretations are logically possible, this option (a perfective interpretation) is the only empirically relevant possibility. I have presented both options, however, to show that either logical possibility (i.e., the presence of either prospective or perfective aspect) would result in a temporal configuration incompatible with the causal/ontic requirement.

156. The antecedent in (298b) is marked with SUBJUNCTIVE morphology. In the second part of this chapter, I will show that SUBJUNCTIVE antecedents like (298b), unless an overt past temporal adverbial is present, must be modified by the perfect *ikaa*- in order to achieve a reading where the antecedent event precedes the utterance time.

(303)

Modal	Licenses Ontic if-r?	Compatible with $t < \tau(e)$?
<i>áak-</i>	✓	✓
<i>aahkama'p-</i>	✓	✓
<i>ohkott-</i>	×	×

Imperfective Temporal Orientations

I now move on to the Blackfoot imperfective *á-* as a licensing context. Recall that the Blackfoot imperfective can be interpreted with either an in-progress/eventive reading, or with a habitual/generic reading. I have assumed a Deo (2009)-inspired denotation for the Blackfoot imperfective, as represented below.

(304) A Deo (2009)-inspired action-dependent denotation for Blackfoot *á-*

$$\begin{aligned} \llbracket \hat{a}\text{-IMPF} \rrbracket^{h,c} = & \lambda P.\lambda t.\lambda x.\lambda w.\exists t'[t \subset_{\text{int}} t' \ \& \ \forall k \in \mathcal{RP}_t^C \\ & [\forall w' \in [\lambda w'.[R(a^\emptyset, x, w', t) \ \& \ w' \in \cap C(w, t, k)_{\leq G(w,t)}]] \\ & \rightarrow \exists t''[P(t'', x, w') \ \& \ t'' \circ k]]] \end{aligned}$$

\mathcal{RP}_t^C is the ‘regular partition’ function: a function which takes an interval (t') and completely partitions it into regular subintervals, k , of a contextually determined length, C .

$t \subset_{\text{int}} t'$ indicates that t is a subset of t' , but an *interior* subset - i.e., t does not contain the initial or final bound of t' .

Note that the denotation involves action-dependent modality. The modality is required to account for (i) the imperfective paradox, and (ii) the fact that the habitual reading requires that the habit continues into the future (cf. Deo (2009)). Note that unlike the action-dependent proposals I put forward for future *áak-*, *aahkama'p-* and ability *ohkott-*, the denotation above does not quantify over actions. Rather, it refers to a specific action, a^\emptyset . The symbol a^\emptyset indicates the null action - i.e., the agent/director taking no action to effect change in the world, or counter inertia. The worlds where the complete P-event takes place, then, are worlds compatible with (i) the agent refraining from consciously affecting change - i.e., the agent taking the null action a^\emptyset , and (ii) the relevant facts for x in w at t . This predicts that the imperfective is only making a claim about worlds where the agent intends to complete the prejacent event (whether or not this is the case in w_0), but the claim can only be made if the agent-external circumstances of the evaluation world (i.e., the circumstances the agent cannot direct) have not conspired to make the P-event impossible.¹⁵⁷ Under the hypothesis that the run-time/duration of the action is what determines a modal element’s temporal perspective (see chapter 4), we would predict that the imperfective’s temporal

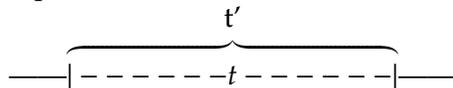
157. We thus predict the infelicity of Landman (1992)’s “Mary was wiping out the Roman Army” and “He was swimming across the Pacific” examples.

perspective time, t , correlates to the run-time of the null action - i.e., is negligible/instantaneous. This is consistent with the imperfective's temporal behaviour: like lexical statives, imperfectives are ambiguous between a past and present reading.

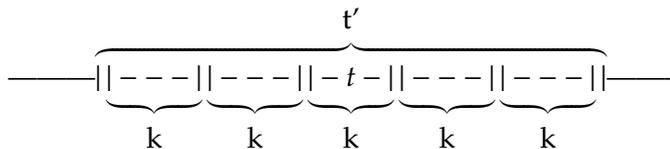
The imperfective's evaluation time, t , bound by the λt operator, serves a dual purpose. With respect to the imperfective's status as an aspect, it provides the reference time - i.e., as an aspect, the imperfective situates the runtime of the event described by its prejacent with respect to t . With respect to the imperfective's modal properties, it provides the temporal perspective time. This is the time that the antecedent is interpreted with respect to. Recall first how the imperfective situates the runtime of the prejacent event with respect to the λt argument. First you take a superinterval, t' , of the evaluation time, t . Then you regularly partition t' into equal intervals of length k . The imperfective then asserts that each of these k -intervals overlaps with a P-eventuality. This is represented with the diagrams repeated below:

(305)

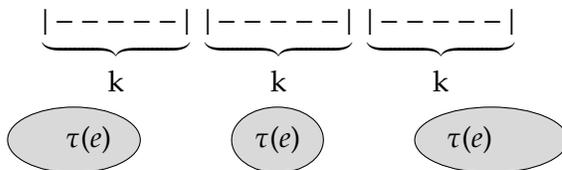
1. Take a superinterval, t' , of the evaluation time, t



2. Regularly partition t' into equal intervals, k .



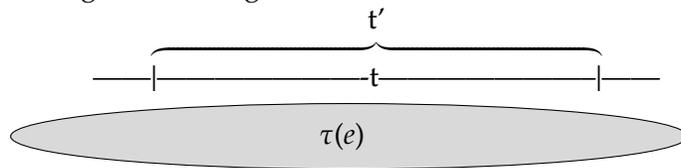
3. Each of these k -intervals overlaps with a P-eventuality



An important thing to be aware of is the fact that the overlap relation is not very strict. Each k -partition can overlap with the beginning of a P-eventuality, the end of a P-eventuality, or an entire P-eventuality, and the overlap relation will still be satisfied, as represented in the above diagram.

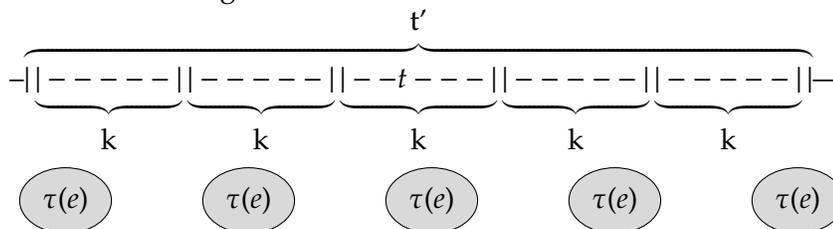
Recall that Deo (2009) derives the various readings of the imperfective by allowing the size of the k -intervals to be contextually specified. If the sizes of the k -intervals are infinitesimally small, then each k -interval is shorter than a P -eventuality. They can thus all overlap with a single P -eventuality in order to satisfy the truth-conditions. This yields an in-progress reading, where the superinterval of the reference time (and hence the reference time) is contained within the run-time of the single P -eventuality (cf. Klein (1994), Reichenbach (1947)). If, on the other hand, the size of the k -intervals is contextually specified so that they are not infinitesimally small, but rather long compared to a normal P -eventuality, then in order for every k -interval of t to overlap with a P -eventuality, many P - eventualities are required. This derives a reading where we have a regular occurrence of P - eventualities (to overlap with each k -interval of the superinterval t'). In other words, a habitual/generic reading.

(306) a. In-Progress Reading



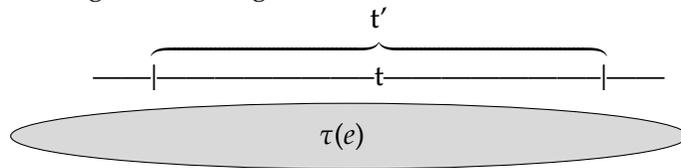
(View each point in the line under t' as representing an infinitesimally small k -interval)

b. Habitual Reading

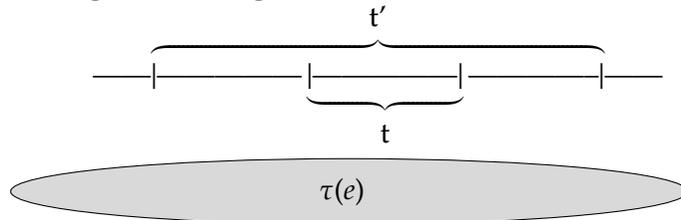


If we take these temporal configurations in hand with the proposed ontic requirement that the antecedent's runtime precede the consequent's runtime, what do we predict about whether the imperfective licenses conditional antecedents? Recall that according to the proposal, the antecedent is a temporally-indeterminate proposition of type $\langle i, \langle s, t \rangle \rangle$ that is incorporated into the consequent modal's circumstantial modal base, itself a set of temporally-indeterminate properties of type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$. The antecedent is thus interpreted with respect to the modal element's temporal perspective time. For the imperfective, this time correlates with the reference/evaluation time, t . If we have a progressive reading, where the k -intervals are infinitesimally small, then the evaluation time, t , either (i) is itself a k -interval, assuming an instantaneous evaluation time like t_0 , illustrated in (307a), or (ii) contains many k -intervals, assuming an interval like t_{PAST} as evaluation time, illustrated in (307b).

- (307) a. In-Progress Reading (Instantaneous Evaluation time)



- b. In-Progress Reading (Interval Evaluation time)



In both cases, t is contained within the runtime of the P-eventuality. Now consider the episodic/progressive examples provided earlier in the chapter, repeated below in (308)-(310).

- (308) **Context:** We realize that it's my brother's birthday, but we've all been so busy that we haven't had time to plan a party or figure out what kind of gift to get him. We don't want to let his birthday pass without doing anything, so I suggest:

kamohpommainiki *owaistsi*, *nitáóhkottsipisatsskiiit*
 kam-ohpommaa-**iniki** owaaa-istsi nit-á-**ohkott**-pisat-ihkiitaa
 if-buy.VAI-**SBJ:loc** egg-0PL 1-**IMPF-ABLE**-fancy-bake.VAI
 "If I buy eggs, I can bake a cake."

- (309) **Context:** My siblings and I get along very well, but when it comes to games and contests, we are very competitive with each other. Every time we're all together somewhere and we see a pool, we have to have a treading-water contest. This time, however, my eldest sister is 7-months pregnant. She still wants to compete, since she is the reigning champion, but we disqualify her, on the grounds that my over-protective mom will have apoplexy. My sister acquiesces, but grumbles:

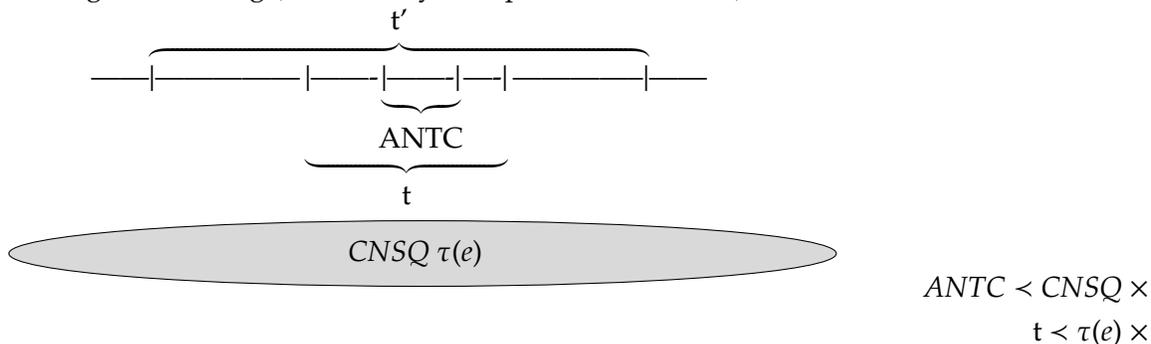
- a. ?# *kamáó'tsiiniki* *nitáóhkottomo'tsaaki*
 kam-á-otsi-**iniki** nit-á-**ohkott**-omo'tsaaki
 if-IMPF-SWIM.VAI-**SBJ:1** 1-**IMPF-ABLE**-win.VAI
 'If I was swimming, I could win.'
BB: More like she's in the water, or talking about like in general
- b. # *nitáótsi'ihtopi* *nitáóhkottomo'tsaaki*
 nit-á-otsi-**htopi** nit-á-**ohkott**-omo'tsaaki
 1-IMPF-SWIM.VAI-**UNR** 1-**IMPF-ABLE**-win.VAI
 'If I was swimming, I could win.'

(310) **Context:** My sister and brother-in-law went up to one of the local mountains, where it's colder than it is at sea-level here in Vancouver, but it's often still too warm for snow in parts of the winter. It starts to rain down here at sea-level, and I remark:

annom áisootaa. kamsstonnatsstoyisi miistaakiistsi, áóohpotaa
 annom á-sootaa-wa. kam-sstonnat-sstoyi-si miistaaki-istsi, á-ohpotaa-wa
 DEM IMPF-rain.VAI-3. if-ints2-cold.VII-SBJ:3 mountain-0PL IMPF-SNOW.VII-3
 'It's raining here. If the mountains are really cold, it snows (*it's snowing).'

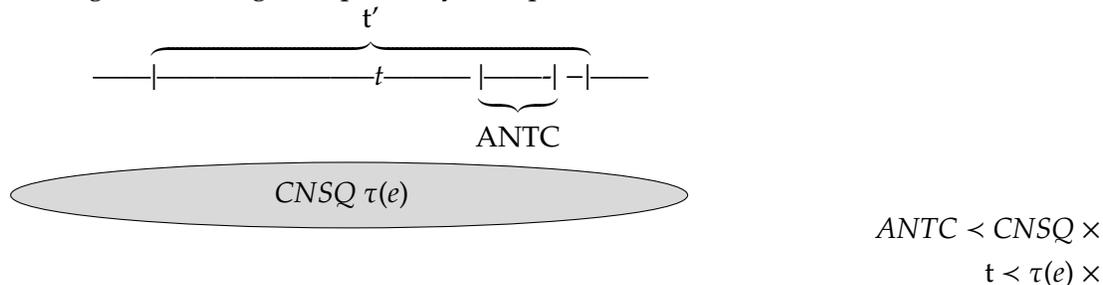
In these cases, the antecedent is aspectually unmarked. We thus expect a perfective, or prospective interpretation - i.e., the antecedent will be interpreted as either being contained within, or following t. Both possibilities are incompatible with the ontic requirement that ANTC < CNSQ. In cases where the antecedent is interpreted perfectly, the antecedent is contained within t, which is itself contained within the runtime of the consequent event.

(311) In-Progress Reading (Perfectively-Interpreted antecedent)

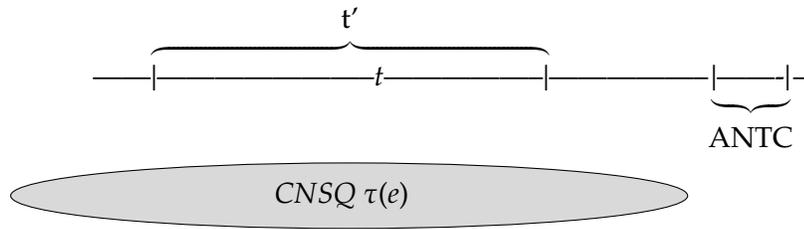


In the cases where the antecedent is interpreted prospectively, the antecedent follows t. This leaves two possibilities with respect to the temporal relationship that holds between the antecedent event and consequent event. One, the antecedent follows t, but is still contained within the runtime of the consequent event. This is incompatible with the ontic requirement that ANTC < CNSQ. The second option is that the antecedent follows t, and also follows the runtime of the consequent event. This similarly is incompatible with the ontic requirement that ANTC < CNSQ.

(312) a. In-Progress Reading (Prospectively-Interpreted Antecedent: Case 1)

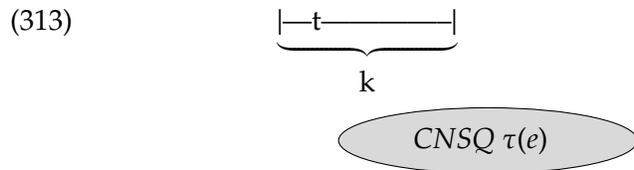


b. In-Progress Reading (Prospectively-Interpreted Antecedent: Case 2)



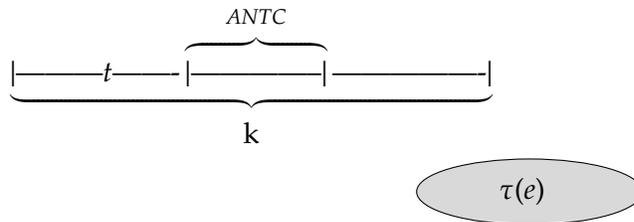
$$\begin{aligned}
 ANTC < CNSQ \times \\
 t < \tau(e) \times
 \end{aligned}$$

If, on the other hand, we have a generic reading, then the k -intervals are not infinitesimally small. This means that the evaluation time, t , can be contained within a k -interval, and yet not be within the part of that k -interval that overlaps with a P -eventuality. This is represented by the diagram in (313).



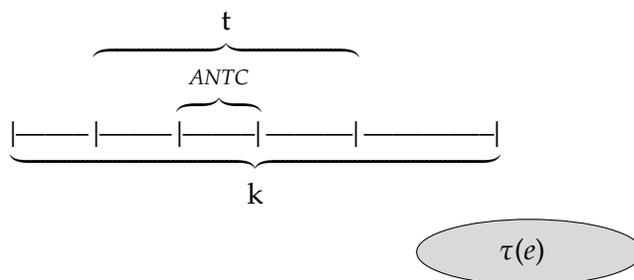
Crucially, this sort of temporal configuration *is* compatible with the ontic requirement whereby the antecedent temporally precedes the consequent. This correlates with the data that we saw in the previous section, where the habitual/generic reading of the imperfective is compatible with a causally-interpreted conditional antecedent, as shown in the diagrams below, for a prospectively (314a) and perfectly (314b) interpreted antecedent.

(314) a. Habitual Reading (Prospectively-Interpreted Antecedent: $t < ANTC$)



$$\begin{aligned}
 ANTC < CNSQ ? \checkmark \\
 t < \tau(e) \checkmark
 \end{aligned}$$

b. Habitual Reading (Perfectively-Interpreted Antecedent: $ANTC \subseteq t$)



$$ANTC < CNSQ ? \checkmark$$

The reader may wonder whether the felicity of the generic cases is due to the availability of a precedence relation between the antecedent and the consequent event (as I have argued), or whether some other factor relating to the generic flavour of habituals licenses the conditional antecedent. The example below provides a context where the consequent imperfective is interpreted iteratively within an episodic context. This is a non-“generic” context, but satisfies the habitual temporal structure where the antecedent event types can precede the consequent event types. Given the felicity of the example, we can conclude that it is indeed the precedence relation between antecedent and consequent, as opposed to some unknown generic factor that licenses the causally-interpreted antecedent.¹⁵⁸

- (315) **Context:** We’re watching my friend train her dog. The dog does a bunch of things, such as rolling over, shaking paws, and jumping. Only sometimes it gets a treat. I think I’ve figured it out, and tell you: “If the dog jumps, he gets a treat.”

óma imitaa kamsspohpai’piyisi, itáyiiisoyiiwayi
óma imitaa-wa kam-ssp-ohpai’piyi-si, it-á-yiiso-yii-wa-ayi
 DEM dog-3 if-up-jump.vai-SBJ:3, RL-IMPF-feed.vta-3:3’-3-DTP
 ‘If that dog jumps, then she feeds him.’

Finally, recall the following example, repeated in (316), where the in-progress imperfective is (infelicitously) modified by a perfect-marked antecedent.

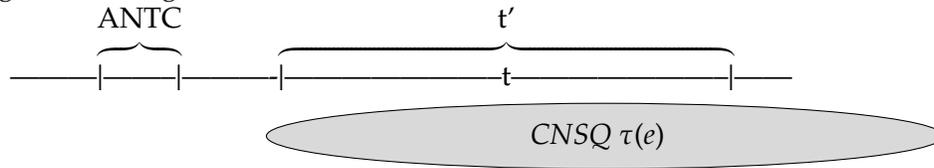
- (316) **Context:** My uncle likes to walk everywhere, but he recently got his leg hurt when he got hit by a car. So he hasn’t been walking as much lately. He’s coming over for dinner, and we’re not sure whether his leg is better and he’s walking over, or whether he’ll have to be driven over by one of his sons. My mom remarks:

kamííkaisoka’pisi ohkatsii, áíksowoo
kam-ikaa-sok-a’pii-si o-ohkat-yi, á-iksowoo-wa
 if-PERF-good-be.vii-SBJ:3 3-leg-0, IMPF-walk.vai-3
 ‘If his leg is better, # he walks.’
 lit: “If his leg has gotten better, he IMPF-walk.”
 Target: If his leg is better, he’s walking.

The combination of temporal operators is compatible with a configuration as follows, where the situation described by the antecedent temporally precedes the situation described by the antecedent.

158. Thanks to Ashwini Deo for pointing out the relevance of this sort of example.

(317) In-Progress Reading (Instantaneous Evaluation time), Perfect Antecedent



$$\begin{aligned}
 ANTC < CNSQ & \checkmark \\
 t < \tau(e) & \times
 \end{aligned}$$

As with the previous *ohkott-* case, although the perfect allows for a temporal configuration that satisfies the intuitive form of the ontic requirement, whereby the antecedent must precede the consequent ($ANTC < CNSQ$), it does not satisfy the proposed grammaticalized form of the ontic requirement, whereby the temporal perspective time, t , must precede the runtime of the consequent event ($t < \tau(e)$). And similarly, the unacceptability of (316) suggests that the intuitive form of the ontic requirement is not enough, and that the grammaticalized requirement that the temporal perspective time precede the runtime of the consequent event is necessary in order to account for the data.

(318) **SUMMARY of PROPOSED GENERALISATION**

Modal	Licenses if-r?	Compatible with $t < \tau(e)$?
<i>áak-</i>	✓	✓
<i>aahkama'p-</i>	✓	✓
<i>á-GEN</i>	✓	✓
<i>á-PROG</i>	×	×
<i>ohkott-</i>	×	×

The Imperfective: an Aspect or a Modal?

I have been referring to the imperfective as "requiring a modal semantics," but have avoided categorizing it as a modal. I suggest that the basic categorizations of the future *áak-*, "might" *aahkama'p-* and ability *ohkott-* as "modals" and the imperfective *á-* as an "aspect" is actually apt - i.e., that whereas the *áak-* "will" modal, the "might" modal *aahkama'p-* and ability modal *ohkott-* are quantifiers over possible worlds, which may encode temporal specifications (i.e., their temporal orientation) within their lexical entries, the imperfective is a temporal quantifier with modal specifications. The difference, I suggest, can be formalized in terms of scope; the true modals have lexical entries where the quantifier over worlds scopes over the quantifier over times (if there is quantification over times encoded by the modal).¹⁵⁹ Although the particular modals I

159. By 'scope' I mean the semantic/logical notion of scope where a quantifier Q_1 scopes over a quantifier Q_2 if $Q_1x\alpha$ is a statement, and Q_2 is contained within α .

have discussed so far (i.e., the "will" *áak-*, "might" *aahkama'p-* and ability *ohkott-*) do not actually include a quantifier over times in their denotation, I do not discount the possibility of modals like (319a) which directly encode their temporal orientation in their denotation (such as proposed by Condoravdi (2002)). Importantly, the modal quantifier $\forall w'$ scopes over the temporal quantifier $\exists t'$, making (319a) a modal.¹⁶⁰

(319) General Template: Modal (MOD) vs Aspect (ASP)¹⁶¹

- a. $\llbracket MOD \rrbracket^{h,c} = \forall w' \in \cap f(w, t) \exists t' [P(t', x, w') \& t < t']$
- b. $\llbracket ASP \rrbracket^{h,c} = \exists t' \forall w' \in \cap f(w, t) [P(t', x, w') \& t < t']$

Aspects like the imperfective, on the other hand, have lexical entries where the temporal quantifier scopes over the introduction of the quantifier over possible worlds, as schematized in (319b), and shown in the denotations below.¹⁶² (320a) shows a simplified denotation for the Blackfoot imperfective, abstracting away from the action-dependent modal framework; (320b) repeats the action-dependent version. As mentioned previously, a^0 stands for the null action - i.e., the agent/director taking no action to effect change in the world/counter inertia. $C(x, w, t)$, as before, indicates the (relevant) set of facts for x in w at time t . Thus the worlds asserted to contain the complete P-event are the worlds compatible with (i) the agent/director maintaining the actions/intentions they have at t , and (ii) the relevant facts of the evaluation world at time t .

- (320) a. $\llbracket \acute{a}\text{-IMPF} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda x. \lambda w. \exists t' [t \subset t' \& \forall k \in \mathcal{RP}_t^C, \forall w' \in \text{MAX}_G(\cap f(w, t, k)) \rightarrow \exists t'' [P(t'', x, w') \& t'' \circ k]]$
- b. $\llbracket \acute{a}\text{-IMPF} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda x. \lambda w. \exists t' [t \subset_{\text{int}} t' \& \forall k \in \mathcal{RP}_t^C [\forall w' \in [\lambda w'. [R(a^0, x, w', t) \& w' \in \cap C(w, t, k)_{\leq G(w, t)}]] \rightarrow \exists t'' [P(t'', x, w') \& t'' \circ k]]]$

\mathcal{RP}_t^C is the 'regular partition' function: a function which takes an interval (t') and completely partitions it into regular subintervals, k , of a contextually determined length, C .

$t \subset_{\text{int}} t'$ indicates that t is a subset of t' , but an *interior* subset - i.e., t does not contain the initial or final bound of t' .

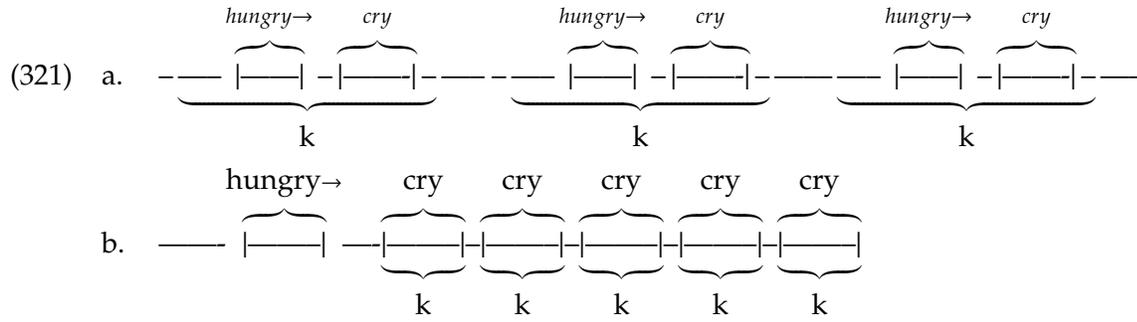
160. Recall that I have proposed that the temporal orientation of the Blackfoot modals is given by the aspectual profile of the modal's complement - i.e., which aspects are contained within the complement - where the kinds of aspects contained within the complement are restricted by the logical properties of the temporal system (i.e., the fact that only particular aspects can hold true of the instantaneous present, or the particular formalization of the agentive ν_{STP} operator).

161. These are sample denotations for a modal and an aspect, not denotations for particular modals or aspects. These denotations are just examples of a modal quantifier scoping over a temporal quantifier and vice-versa.

162. But see Arregui et al. (2011), where the imperfective is treated as a quantifier over situations, where the situation-framework collapses the formal distinction between modality and temporality.

This difference in scope is required in order to account for the meaning of the conditionals licensed by the generic imperfective. Recall the examples given above: "If she gets hungry, she cries," "If she gets cold, she pees," and "If the mountains are/get really cold, it snows." These claim that for every instance of the antecedent event occurring during a subinterval of the superinterval t' , a P-event follows soon after. This is what we expect given a denotation as above, where the universal quantifier over times (partition intervals, more specifically), scopes over the introduction of the modal quantifier. The antecedent, which is incorporated into the modal quantifier's modal base, is thus likewise in the scope of the universal quantifier over times. Because the antecedent involves existential quantification over an event that satisfies the antecedent's predicate, this means that for every relevant subinterval of the superinterval t' , there exists an event that satisfies the antecedent predicate. And each of these antecedent events causes (or is necessary to the causation of) a consequent event that overlaps with each relevant subinterval of t' . Note that I have the imperfective's accessibility function, f , taking two temporal arguments: the reference time t , and the partition variable k . Although I will not attempt a detailed account of how the accessibility function should be modelled, I suggest that the imperfective's accessibility function needs to somehow project the circumstances and general laws that hold at t in w , to each k -interval - i.e., the claim of the k -intervals overlapping with P-events is only made under the supposition that the facts and general laws holding at the reference time also hold during these k -intervals. Thus the supposition of the conditional antecedent that is incorporated into the modal base at time t , will be projected onto the k -intervals as well. The temporal relation between the antecedent event and k -intervals could be either perfective containment or overlap; either specification allows for the required temporal configuration for causality, where the antecedent event temporally precedes the consequent event.

Contrast the scope analysis above with one where the imperfective had a denotation as below. In this denotation, where the modal quantifier scopes over the universal quantifier over times, we would expect a different sort of reading: the antecedent, which is incorporated into the modal quantifier's modal base, should introduce an event that scopes outside of the universal quantifier over times. Conditionals licensed by the generic imperfective would then have truth-conditions as follows: In all worlds where there is a single event satisfying the antecedent's predicate, this event causes (or is necessary to the causation of) the habit described by the imperfective consequent claim. Thus the claim "when my niece gets hungry, she cries" would not describe a world where events of my niece getting hungry are regularly followed by events where my niece cries (321a), but rather would describe a world where a single event of my niece getting hungry is followed by her developing a regular schedule of crying events (321b). This is not the reading that the Blackfoot sentence (or English translation) conveys.



This suggests that the denotation in (320), where the temporal quantifier scopes over the modal quantifier, better models the imperfective's meaning than the denotation in (322), where the modal quantifier scopes over the temporal quantifier.

$$(322) \quad \llbracket \hat{a}_{\text{-IMPF}} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda x. \lambda w. \forall w' \in \text{MAX}_G(\cap f(w, t)) \\ [\exists t' [t \subset t' \ \& \ \forall k \in \mathcal{RP}_v^C \rightarrow \exists t'' [P(t'', x, w') \ \& \ t'' \circ k]]]$$

5.2.3 Evidential Conditionals

I have argued that ontically-interpreted conditional antecedents cannot be licensed by the ability modal *ohkott-* or the in-progress reading of the imperfective *á-*. In this section I show that cases where they appear to license conditional antecedents are all instances of evidential conditionals, where the situation described by the antecedent acts as evidence for the truth of the consequent.

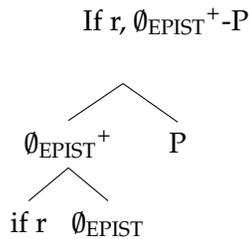
Evidential conditionals do not require an overt modal in order to be licensed, as shown by (323) below. The main clauses in (323a) and (323b) lack overt modals in their consequent, yet license conditional antecedents.

(323) **Context:** My sister calls us while we're out, saying she wants to bake a pie, but is having trouble finding the butter. We tell her to check the freezer, although we warn her it's a mess, and hard to find things in. When we get home, the kitchen smells like pie, so I remark:

- a. *ihkiitaawohtopi* sitokihkiitaan, *iihkoonim* *annihkayi* *iihtaisstsikaahkimo'pi*
ihkiitaa-ohtopi sitokihkiitaan, *ii-ohkooni-m* *annihkayi* *iihtaisstsikaahkimo'pi*
 bake.VAI-UNR pie, ic-find.VTI-3:0 DEM butter
 'If she baked a pie, she found the butter.'
- b. *kamíikaihkiitaasi* sitokihkiitaan, *iihkoonim* *omi* *iihtáísttsikóóhkimo'pi*
kam-ikaa-ihkiitaa-si sitokihkiitaan, *ii-ohkooni-m* *omi* *iihtáísttsikóóhkimo'pi*
 if-bake.VAI-SBJ:3 pie, ic-find.VTI-3:0 DEM butter
 'If she baked a pie, she found the butter.'

Kratzer (1981, 2012) proposes that cases like this in English are not exceptions to her proposal that conditional antecedents restrict modals in the consequent. Rather, she proposes that the conditional antecedents act to restrict a null universal epistemic/evidential modal \emptyset in the main clause. I suggest that the same is true of Blackfoot - i.e., that Blackfoot has a null universal epistemic/evidential modal that conditional antecedents can restrict. This would account for why conditionals that lack an overt licensing modal are acceptable when the antecedent is interpreted evidentially.

(324) Evidential Conditional: Bare Complement



Consider now the following examples, with a main-clause *ohkott-*. Unlike the *ohkott-* data considered in the previous section, the conditional constructions in (325a) and (325b) are acceptable.

(325) **Context:** My sister calls us while we're out, saying she wants to bake a pie, but is having trouble finding the butter. We tell her to check the freezer, although we warn her it's a mess, and hard to find things in. When we get home, the kitchen smells like pie, so I remark:

a. *ihkiitaawohtopi sitokihkiitaan, iihkottohkoonim annihkayi*
ihkiitaa-ohtopi sitokihkiitaan, ii-ohkott-ohkooni-m annihkayi
 bake.VAI-UNR pie, ic-ABLE-find.VTI-3:0 DEM
iihtaisstsikaahkimo'pi
iihtaisstsikaahkimo'pi
 butter

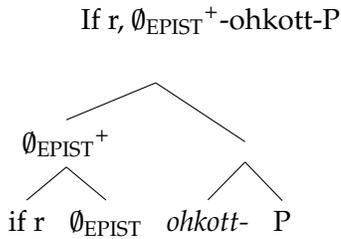
"If she baked a pie, she was able to find the butter."

b. *kamíikaihkiitaasi sitokihkiitaan, iihkottohkoonim omi*
kam-ikaa-ihkiitaa-si sitokihkiitaan, ii-ohkott-ohkooni-m omi
 if-bake.VAI-SBJ:3 pie, ic-ABLE-find.VTI-3:0 DEM
iihtáísttsikóóhkimo'pi
iihtáísttsikóóhkimo'pi
 butter

'If she baked a pie, she was able to find the butter.'

The difference, I suggest, is that the examples in (325) are evidential conditionals, as my sister baking the pie stands as evidence for the truth of her having found the butter. I suggest that these are analogous to the previous examples, having a structure as below, where it is not *ohkott-* that is licensing the antecedent, but a null universal epistemic modal.

(326) Evidential Conditional: Ability Complement



I suggest that the same analysis can account for cases where the in-progress reading of the imperfective appears to license conditional antecedents like (327).

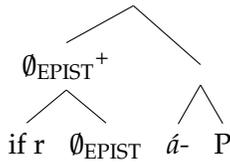
(327) **Context:** My sister just had a baby, and my brother-in-law has come home from work. He gets home, looks at the time and sees that it's about time for the baby to be hungry. He notices that the house is quiet, and figures:

- a. *kámsawaasai'nisi, áísttaa*
 kam-sa-waasai'ni-si, á-sstaa-wa
 if-NEG-cry.VAI-SBJ:3, IMPF-nurse.VAI-3
 'If she's not crying, she's nursing.'
- b. *kámsawaasai'nisi, aahkáísttaa*
 kam-sa-waasai'ni-si, aahk-á-sstaa-wa
 if-NEG-cry.VAI-SBJ:3, EPIST-IMPF-nurse.VAI-3
 'If she's not crying, she must be nursing.'

In the given context, the antecedent situation (the baby not crying) is evidence for the truth of the situation depicted by the consequent (the baby being nursed). We thus posit a structure like (328), where the in-progress reading of the imperfective is not the modal element that licenses the conditional antecedent; rather a null universal epistemic modal plays that role. The felicity of (327b), which has an overt epistemic modal, *aahk-*, in the given context, suggests that this sort of analysis is on the right track.

(328) Evidential Conditional: In-Progress Complement

If r, $\emptyset_{\text{EPIST}^+}$ -á-P



As a point of crosslinguistic variation, I will point out that Blackfoot evidential conditionals have a more limited distribution than their English counterparts. Consider, for example, the following data. In (329), the context is such that the antecedent acts as evidence for a habitual claim. Whereas the English target “If he packs his shoes, he runs (habitually)/is a runner” is (somewhat) acceptable, the Blackfoot approximation is not.¹⁶³

- (329) **Context:** My dad claims that he’s been going running regularly. We’re a little skeptical, thinking he might just be saying that, to get us off his back about exercising. Since we’re going on a little vacation, we decided that we’ll be able to tell if he’s truthful by what he packs, because real runners will pack their shoes with them.

# <i>kámohpaatoosi</i>	<i>matsikíistsi,</i>	<i>áókska’si</i>
kam-ohp-aaat-oo-si	matsikin-istsi	,á-okska’si-wa
if-assoc-move.vrt-go.vai-sbj:3	shoe-0PL,	IMPFUN.vai-3

‘If he brought his shoes, he runs/is a runner.’

The data in (330) is another example of this restriction. Again, the antecedent acts as evidence for the universal claim represented by the consequent. Whereas the English target ‘If the next card is red, all of the cards are red’ is acceptable, the Blackfoot (330a) is unacceptable, unless further modified with another modal, as in (330b).

- (330) **Context:** I suspect that the deck of cards in front of me is rigged, so that they’re all red. But I’ll turn over one last card before making my conclusion.

a. # <i>amo kaahtsa’tsii</i>	<i>kamomáóksinattsisí</i>	<i>áóhkanomaohksinattsiyaa</i>
amo kaahtsa’tsi-yi	kam-omaohksinattsi-si	á-ohkana-omaohksinattsi-yi-aawa
DEM card-0	if-red.vii-sbj:3	IMPF-all-red.vii-3pl-DTP

Target: ‘If that card is red, they’re all red.’

b. <i>amo kaahtsa’tsii</i>	<i>kamomáóksinattsisí</i>	<i>áakohkanomaohksinattsiyaa</i>
amo kaahtsa’tsi-yi	kam-omaohksinattsi-si	áak-ohkana-omaohksinattsi-yi-aawa
DEM card-0	if-red.vii-sbj:3	FUT-all-red.vii-3pl-DTP

‘If that card is red, they will all be red.’

163. While speakers may vary in terms of whether they accept “If he packs his shoes, he runs,” I think that “If he packs his shoes, he’s a runner” is uncontroversially acceptable, and the Blackfoot *áókska’si* is ambiguous/underspecified between meaning “he runs” and “he is a runner.”

I suggest that the relevant distinction between the acceptable cases in (323) and (327a) on the one hand, and the unacceptable cases in (329) and (330) on the other hand, can be characterized in terms of the type of reasoning employed. Whereas the acceptable cases were instances of deductive inferences, the unacceptable cases are instances of inductive inferences. I return to this puzzle in chapter 6.

On the topic of non-ontic conditionals, Blackfoot also allows for “relevance” or “biscuit” conditionals (Austin (1961), Bhatt & Pancheva (2006), a.o.). These sorts of conditionals differ from both ontic and evidential conditionals in that the truth of the consequent holds in w_0 , regardless of the truth-status of the antecedent. Some examples of relevance conditionals in Blackfoot are given below. We can observe from (331) that like the evidential conditionals, relevance conditionals in Blackfoot do not appear to require an overt modal in the consequent. As a careful investigation of relevance conditionals in Blackfoot has not been conducted, I consider relevance conditionals to be outside of the scope of this dissertation.

(331) a. **Context:** I’m starving, but dinner isn’t ready yet. You tell me:

kamisttso’kiniki, itstsii’p napayin
kam-isttso’kini-iniki, itstsii-’p napayin
 if-hungry.VAI-SBJ:LOC, exist.VII-LOC:0 bread

‘If you’re hungry, there’s bread.’

b. **Context:** You’re holding an onion and asking me where the knives are. I already cut up some onions yesterday, so tell you that you don’t need to bother:

kamáaksipini’tainiki oma pisatsiinikim, nitsíikaypiinitaki matónni
kam-áak-ipini’t-a-iniki oma pisatsiinikim-wa, nit-iikaa-ipi’nitaki matonni
 if-FUT-slice.VTA-LOC:3-SBJ:LOC, DEM onion-3, 1-PERF-slice.VAI yesterday

‘If you’re gonna cut up that onion, I already cut some up yesterday.’

To summarize, ontic conditionals are subject to licensing restrictions that evidential and relevance conditionals are not subject to. This is not surprising under an analysis like the one proposed here, where the licensing conditions associated with the ontic conditionals are derived from the temporal nature of causation - i.e., a grammaticalized form of the intuition that causes precede their effects.

5.2.4 Incorporating Antecedents into Ordering Sources

A final note of interest: the kind of ontic conditionals I have discussed are, for the most part, conditionals where the antecedent hypothesizes about the external circumstantial facts about the world. This can be accounted for under the formalization above, where the conditional antecedent is incorporated into the circumstantial modal base C^+ . There are, however, conditionals where

the antecedent hypothesizes about the agent's goals, as in (332). A Blackfoot example is given in (333).¹⁶⁴ These are anankastic conditionals, as discussed in von Stechow & Iatridou (2005), von Stechow et al. (2006), a.o.

(332) If you want to go to Edmonton, you can take a bus or take a plane.

(333) *nitái'nakststsi'si* *kitayaakitapoohtopi* *síkoohkotoki*
 nit-a'-i'nak-ststsi-'si kit-ayaak-itap-oo-ohtopi sikoohkotoki
 1-INCH-small-be.VAI-CJ 2-PFUT-towards-go.VAI-IRR Lethbridge
kitáaksstsinoohtsi'tapoo *áínaka'si* *ki* *an'ohk* *kitáakitapaawaani*
 kit-áak-sstsi-na'-ooht-itap-oo ainaka'si ki annohk kit-áak-itap-aawaani
 2-FUT-have.to-means-towards-go.VAI wagon conj now 2-FUT-towards-fly.

'When I was young, you would have to go to Lethbridge via wagon, but today you'll be able to fly there.'

lit. "When I was young, if you wanted to go to Lethbridge, you would have to go by wagon, but now you'll fly there."

Conditionals like these may require an analysis where the conditional antecedent is incorporated into the bouletic conversational background $\mathcal{B}(x,w,t)$ as opposed to the circumstantial conversational background.¹⁶⁵ We could thus conceive of a \mathcal{B}^+ with similar properties to \mathcal{C}^+ . I will abstract away from the issue of goal-oriented anankastic conditionals, however, as I have not yet completed enough fieldwork to investigate this issue thoroughly.¹⁶⁶

A parallel issue arises with evidential conditionals - in the system set up in chapter 4, an epistemic modal quantifies over hypotheses available to the speaker in c , $\mathcal{H}(\text{Sp}(c),w,t)$, where these hypotheses are ordered by an evidential conversational background, $\mathcal{E}(\text{Sp}(c),w,t)$.

(334) $\llbracket \text{must} \rrbracket^{h,c} = \lambda P. \lambda x. \lambda t. \lambda w. \exists h \in \mathcal{H}(\text{Sp}(c),w,t)_{\leq \mathcal{E}(\text{Sp}(c),w,t)}$
 $[\forall w' [\forall Y [w' \in [\lambda w' [R(h, x, w', t) \& w' \in \cap D(\text{Sp}(c), w, t)_{\leq G(w,t)}]]]]] \rightarrow P(t, x, w')$

As an evidential conditional is one where the antecedent describes evidence, the antecedent should be incorporated into the evidential conditional's evidential ordering source, as a goal should be incorporated into an ontic conditional's bouletic ordering source. We might thus also

164. The translation given, as is the case with the majority of the data I present, is provided by my consultant. I have provided the second translation on the line below, which is more reflective of the syntactic structure of the construction.

165. The idea that these sorts of conditionals involve incorporation of the antecedent into the ordering source, as opposed to the modal base, was suggested to me by Hotze Rullmann.

166. More specifically, (333) is the sole example of a goal-oriented anankastic conditional that I have elicited. I therefore lack the data to make generalisations regarding how goal-oriented anankastic conditionals in Blackfoot behave, and what sort of restrictions they may be subject to. Thus, proposing an analysis would be "jumping the gun."

posit an \mathcal{E}^+ for evidential conditionals. I leave the further investigation of this issue, however, for a time when more data on epistemic/evidential conditionals in Blackfoot has been gathered.¹⁶⁷

5.2.5 Section Summary: Conditional Licensing Correlates with Temporal Orientation

In this section, I presented a puzzle regarding the distribution of ontic conditionals: while the “will” and “might” modals *áak-* and *aahkama’p-* can license ontic conditional antecedents, the ability modal *ohkott-* fails to. I proposed that the underlying reason behind *ohkott-*’s failure to license conditional antecedents lay in its perfective containment temporal orientation, where this sort of containment temporal orientation was a necessary consequence of the agentivity-driven analysis for *ohkott-*’s temporal perspective proposed in the previous chapter (chapter 4). I proposed that *ohkott-*’s required temporal orientation is incompatible with a requirement that the temporal perspective time, *t*, precede the runtime of the consequent event (the “ontic requirement”). I also showed that Blackfoot’s imperfective, *á-*, licenses ontic conditional antecedents under its habitual/generic reading but fails to do so under its episodic in-progress reading. I proposed that the underlying reason behind the imperfective’s failure to license conditional antecedents under its in-progress reading is parallel to the failure of *ohkott-* to license conditional antecedents: the temporal orientation associated with the imperfective’s in-progress readings is incompatible with the ontic requirement that the temporal perspective time, *t*, precede the runtime of the consequent event.

In the following section I discuss a puzzle about the restricted range of temporal interpretations associated with ontically-interpreted SUBJUNCTIVE conditional antecedents. I suggest that the causes underlying the restricted temporal patterns are nothing new. Rather, they follow from (i) the assumption that a conditional antecedent is interpreted with respect to its licensing modal’s temporal perspective time (a crucial assumption of the analysis of the previous section), and (ii) the assumption that Blackfoot’s present tense is instantaneous (Reis Silva & Matthewson (2008)).

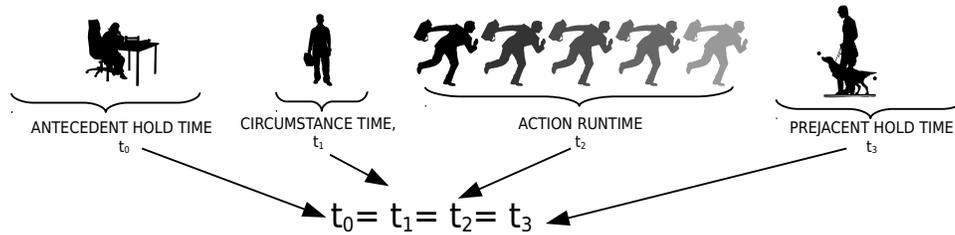
5.3 Constraints on Conditional Antecedents

In section 5.1.2 I discussed a categorization of Blackfoot conditionals in terms of their antecedent’s morphological clause-type: SUBJUNCTIVE and UNREAL conditionals. In this section, I turn to the question of what the semantic reflex of this morphological contrast is. I show that SUBJUNCTIVE and UNREAL conditionals are nearly, but not quite, in complementary distribution. While the semantic distribution of SUBJUNCTIVE conditionals can be characterized on a purely temporal basis, a characterization of the semantic distribution of UNREAL conditionals must refer to both time and

167. For instance, I have not even elicited enough examples of epistemic/evidential conditionals to determine whether the antecedent must be direct evidence *of* the consequent event, or whether the antecedent only needs to be information which could be used to conclude that the antecedent is true. In the former case, the antecedent should not be able to precede the consequent, but in the latter case, this restriction may not hold.

counterfactuality.

This section is organized as follows. First I discuss the distribution of **SUBJUNCTIVE** conditionals, showing that their temporal interpretation depends on the main clause modal's temporal perspective. More specifically, I show that when (as is default), the temporal perspective is present, the event described by a **SUBJUNCTIVE** antecedent can be interpreted as occurring during and after the utterance time, t_0 , but cannot be interpreted as preceding the utterance time t_0 . Pretheoretically we can describe the distribution as follows: while a **SUBJUNCTIVE** antecedent can be interpreted as present or future, it cannot be interpreted as past. I argue that this distribution follows from a basic assumption made in the previous section - i.e., that conditional antecedents are evaluated temporally with respect to the main clause modal's temporal perspective time, t .



(Where **CIRCUMSTANCE TIME** = Temporal Perspective Time)

Figure 5.2: Correlation of Times for a Blackfoot Circumstantial Conditional

Because the temporal perspective time is, by default, the instantaneous t_0 , an aspectually-unmarked conditional antecedent can only be interpreted as a simple present (for a stative), or present prospective (for an eventive). This follows from some theoretical assumptions motivated in chapters 2 and 4 - i.e., the assumption that only stative or stativized elements can hold true of an instantaneous evaluation time, and the assumption that the absence of overt aspect in Blackfoot can only be interpreted as either (i) a lack of aspect, (ii) null prospective aspect or (iii) null perfective aspect. As a perfective-marked predicate can only hold true of non-instantaneous evaluation times, only coinciding and prospective interpretations are allowed. In order to obtain other temporal interpretations, the presence of overt stativizing aspects (like the perfect *ikaa-* or imperfective *â-*) is required.

I then discuss the distribution of **UNREAL** conditionals. To properly describe the distribution of **UNREAL** conditionals, we must distinguish between **COUNTERFACTUAL** and **POSSIBLE** (i.e., non-counterfactual) premises, as in (335).

(335) **POSSIBLE VS COUNTERFACTUAL** premises

a. **POSSIBLE**

$P(t,x,w)$ is not known to be false

- i.e., both $P(t,x,w)$ and $\neg P(t,x,w)$ are compatible with $\mathcal{E}(\text{Sp}(c), \mathbf{t}_0, \mathbf{w}_0)$.

$\exists w' \in \cap \mathcal{E}(\text{Sp}(c), \mathbf{t}_0, \mathbf{w}_0) [P(t,x,w')]$ &

$\exists w' \in \cap \mathcal{E}(\text{Sp}(c), \mathbf{t}_0, \mathbf{w}_0) [\neg P(t,x,w')]$

b. COUNTERFACTUAL

$P(t,x,w)$ is known to be false

- i.e., $P(t,x,w)$ is not compatible with $\mathcal{E}(\text{Sp}(c), \mathbf{t}_0, \mathbf{w}_0)$.

$\forall w' \in \cap \mathcal{E}(\text{Sp}(c), \mathbf{t}_0, \mathbf{w}_0) [\neg [P(t,x,w')]]$

I show that while counterfactual UNREAL antecedents have no temporal restrictions, non-counterfactual UNREAL antecedents can only have past temporal interpretations - i.e., the antecedent event must precede \mathbf{t}_0 . I propose that this distribution can be formalized in terms of a presupposition regarding the evaluation worlds and times where the temporally-indeterminate antecedent proposition holds true. More specifically, these worlds and times form a pair, $\langle w, t \rangle$, presupposed to be distinct from $\langle \mathbf{w}_0, \mathbf{t}_0 \rangle$. In counterfactual cases, this presupposition is satisfied by the knowledge that $w \neq \mathbf{w}_0$. There is thus no restriction on the temporal argument in $\langle w, t \rangle$, accounting for the lack of temporal restrictions in counterfactual antecedents. In non-counterfactual cases, where it is not previously settled that $w \neq \mathbf{w}_0$, the presupposition that $\langle w, t \rangle \neq \langle \mathbf{w}_0, \mathbf{t}_0 \rangle$ can only be satisfied if the interlocuters have the knowledge that $t \neq \mathbf{t}_0$. Recall that in the temporal system proposed for Blackfoot, there are only two tenses: $\emptyset_{\text{PRESENT}}$ and \emptyset_{PAST} , which map onto the temporal variables \mathbf{t}_0 and $\mathbf{t}_{\text{IPAST}}$. This leaves only the variable $\mathbf{t}_{\text{IPAST}}$ to provide the temporal perspective time, accounting for the strictly past interpretations.¹⁶⁸

(i)↓ (ii)→	SBJ ANTC		UNR ANTC	
	Possible	Counterfactual	Possible	Counterfactual
ANTC < \mathbf{t}_0	×	×	✓	✓
ANTC ° \mathbf{t}_0	✓	✓	×	✓
\mathbf{t}_0 < ANTC	✓	✓	×	✓

Table 5.2: (i) Temporal and (ii) Epistemic Restrictions on "If"-clauses

5.3.1 Blackfoot SUBJUNCTIVE Conditional Antecedents

In this section I show that Blackfoot SUBJUNCTIVE conditional antecedents are restricted in their temporal interpretation. This restriction correlates, however, with the temporal perspective of the consequent's modal: the temporal interpretation of the SUBJUNCTIVE antecedent is only restricted when the consequent modal's temporal perspective is present (\mathbf{t}_0). I first discuss the default case,

168. This does not actually rule out a past prospective interpretation. However, as I will discuss in more detail in chapter 6, I will show that a past prospective interpretation where the runtime of the antecedent event follows \mathbf{t}_0 is ruled out by the interaction between prospective aspect and the branching-futures framework I adopt.

where no overt temporal adverbial is provided. In these cases, the temporal perspective time is t_0 . This is a general property associated with stative and stative-like elements in Blackfoot - while they can be interpreted with respect to both past and present evaluation times (i.e., past and present tense for a non-modal claim, past and present temporal perspective times for *áak-* and *aahkama'p-* claims), they require overt temporal adverbials in order to be interpreted with respect to a past evaluation time.

This generalization can be illustrated with Blackfoot's perfect *ikaa-*. Predicates marked with *ikaa-* are felicitous with either a past or present evaluation time, however a past perfect interpretation requires an overt past temporal adverbial. This is shown in (336). The given context makes a past time adverbial contextually-salient, however the perfect form (with a past perfect target interpretation) in (336a) is rejected. When the past time adverbial is made linguistically overt, as in (336b), however, the perfect form with a past perfect interpretation is accepted.

(336) **Context:** I'm telling a story about my family. I start talking about when my mother was born, while her family was migrating from China to Hong Kong, and then talk about how my father was already born a few years earlier, in a village near Zhongshan.

- a. # *annahk nínn akaitsi'pokaa aapamohtsi*
 annahk n-nínn-yi **akaa-it-i'pokaa**(wa'si)-wa waapam-ohtsi
 DEM 1-father-3' PERF-RL-be.born.VAI-3 across.ocean-LOC

#'My father has already been born in China.'

Target: '(At that point) My father had already been born in China.'

BB:

No, doesn't make sense.

- b. *annahk níksisst otai'tsstsisi annahk nínn*
 annahk n-iksist-wa ot-á'-it-sstsi(si)-hs-yi annahk n-nínn-yi
 DEM 1-mother-3 3'-inch-RL-be.source.of.stinging.pain.VII-CJ-0 DEM 1-father-3'
akaitsi'pokaa aapamohtsi
akaa-it-i'pokaa(wa'si)-wa waapam-ohtsi
 PERF-RL-be.born.VAI-3 across.ocean-LOC

'When my mother was born, my father had already been born in China.'

This preference for a present, as opposed to past, temporal interpretation was also observed previously, in chapter 4, where I pointed out that while *áak-* and *aahkama'p-* claims can be interpreted with respect to either a present or past temporal perspective, the latter reading usually requires overt linguistic modification, such as the presence of a past-interpreted conditional antecedent.¹⁶⁹ From this I conclude that the examples in the following section, which lack both overt past temporal adverbials and specific contexts making past evaluation times contextually salient,

169. In that chapter I pointed out that while basic *áak-* and *aahkama'p-* claims have this property, *áak-* claims that have *ohkott-* claims as their preadjacent, do not (see also chapter 7). *áak-ohkott-* claims are compatible with both past and present temporal perspective times, and do not require an overt conditional antecedent or temporal adverbial for the latter reading. I leave an analysis as to why this is the case for further research.

take t_0 as their temporal perspective time.

After discussing the temporal restrictions of present-perspective SUBJUNCTIVE conditionals, I turn to a discussion of SUBJUNCTIVE conditionals where an overt past time adverbial is provided - i.e., cases where the temporal perspective time is specified as t_{iPAST} . We will see that the restrictions that arise when the temporal perspective time is t_0 do not arise when the temporal perspective time is specified as t_{iPAST} .

SUBJUNCTIVE Distribution: Main Clause TP=Present

In this section, I discuss Blackfoot SUBJUNCTIVE conditionals that lack overt temporal adverbials. In these cases, the temporal perspective time is taken, by default, to be t_0 . We will see that the event described by a SUBJUNCTIVE conditional antecedent can be interpreted as coinciding with, or following t_0 , but cannot be interpreted as preceding t_0 .

Blackfoot SUBJUNCTIVE conditionals are usually translated with English indicative conditionals. Thus, in what follows, I will often discuss the distribution of English indicative conditionals in order to better point out how the distribution of Blackfoot SUBJUNCTIVE conditionals differs.

Speculation about future events is expressed in English via indicative conditionals. Speculation about future events is similarly expressed in Blackfoot via SUBJUNCTIVE conditionals. Consider (337), where we speculate about the possibility that we might, in the near future, tell my brother about the demise of his childhood pet. In this context, a SUBJUNCTIVE conditional is used.

- (337) **Context:** When my brother was very young, his pet frog got sucked up the filter. Because he was a very sensitive child, we told him the frog went back to live with its family. Twelve years later, we figure it's safe to tell him now.

kamsskssiniisi anohk omáánista'pihpi máátáakohtsikííwaatsiks
kam-ssksini-si anohk om-aanist-a'pii-hp-yi máát-áak-ohtsikii-waatsiksi
if-know.VTI-SBJ:3 now 3-manner-happen.VII-CJ-0 NEG-FUT-care.about.sthg.VAI-3:nonaff.sg
'If he found out what happened now, he wouldn't care'

(338) is similar - if we are speculating about the possibility that my brother might, in the near-future, drink lots of milk, a SUBJUNCTIVE conditional is used.

- (338) **Context:** I am getting revenge on my brother. I have smeared vaseline all over the toilet seat so that he has a surprise when he sits down. My sister is dubious about my plan and asks me how I plan to make sure he goes to the bathroom. I figure I have this covered, because my brother is hilariously lactose-intolerant.

kamsskai'ssimiisi *ónnikis, áakotoisapiohsi*
 kam-sska'-simi-si onnikis, áak-oto-isapiohsi
 if-extreme-drink.VAI-SBJ:3 milk, FUT-go.to-have.the.runs.VAI
 'If he drinks a lot of milk, he will have the runs.'

Recall that given the temporal system proposed in chapter 2, there are only two tenses available to a semantic composition: $\emptyset_{\text{PRESENT}}$ and \emptyset_{PAST} , which map onto the temporal variables t_0 and t_{PAST} . Future temporal reference is constructed via the contribution of a null prospective aspect. Thus while the conditionals above can be pretheoretically described as involving a “future” antecedent and consequent, given the semantic framework proposed in chapter 2, the conditionals should rather be categorized as involving a present prospective antecedent and consequent.¹⁷⁰ The data above can thus be theoretically described as per the following table, where the antecedent is represented as having been “stativized” by means of a (null) prospective aspect.

Antecedent Proposition	Felicity
“Future”: $t_0 < \tau(e)_{\text{ANTC}}$	✓

Unlike English indicative conditionals, Blackfoot SUBJUNCTIVE conditionals cannot be used to speculate about past events. Consider the context in (339), where we speculate about the possibility that in the past (yesterday), my sister won the race she was running in. In this context, where an English indicative would be used, a Blackfoot SUBJUNCTIVE, by contrast, is infelicitous.

- (339) **Context:** My sister was running in a race yesterday. I haven't heard whether she won or not yet, but I hope she did, because if she won, we'll eat cake to celebrate.

kamomo'tsaakisi matónni nitáakitsoyihpinnaan pisátsskiitaan
 kam-omo'tsaaki-si matonni nit-áak-it-loyi-hpinnaan pisatsskiitaan
 if-win.VAI-SBJ:3 yesterday 1-FUT-RL-eat.VAI-1PL.EXCL cake
 'Target: If she won yesterday, we will eat cake.'

In these sorts of context, either an UNREAL conditional must be used (as in (340)), or perfect morphology *ikaa-* must be added to the SUBJUNCTIVE antecedent.¹⁷¹ In this case, however, we are

170. Recall that this section deals only with conditionals with present temporal perspectives. This is why a past prospective interpretation is not considered.

171. I have attempted to obtain a minimal pair of (340) that contained SUBJUNCTIVE morphology and the perfect *ikaa-*, however this was not accepted by my consultant. I suspect that Blackfoot's perfect, like the English perfect, has (so far uninvestigated) current-relevance restrictions; in my judgements, anyways, the correlating English form with a present perfect translation “If she has won yesterday, we will eat cake” sounds a little strange, whereas a perfect translation of (341) “If she's left her office, she'll have locked her door” does not sound strange. I leave the investigation and description of Blackfoot's perfect *ikaa-* for further research.

no longer hypothesizing about a past (perfective) possibility, but instead are hypothesizing about a present perfect possibility. This is shown in (341).

- (340) **Context:** My sister was running in a race yesterday. I haven't heard whether she won or not yet, but I hope she did, because if she won, we'll eat cake to celebrate.

íimotsaaki'ohtopi matónni nitáakitsoyihpinnaan pisátsskiitaan
 ii-omo'tsaaki-**oh**topi matonni nit-áak-it-Ioyi-hpinnaan pisatsskiitaan
 ic-win.VAI-UNR yesterday 1-FUT-RL-eat.VAI-1PL.EXCL cake

'If she won yesterday, we will eat cake.'

- (341) **Context:** We aren't sure if Martina is at the department or not. I saw her earlier, but maybe she's left campus since then. I do know, however, that Martina always locks her office before she leaves, so I can find out that way, whether or not she left.

a. # *annahk M kamomatoosi omi otsita'potakihpi áakitapiyookim ohkitsim*
 annahk M kam-omatoos**i** omi ot-ita'potakihpi áak-itapiyooki-m o-kitsim
 DEM M if-leave.VAI-SBJ:3 DEM 3-workplace FUT-lock.VTI-3:0 3-door

'If Martina **left** her office, she will have locked her door.'

b. *annahk M kamikoomatoosi omi otsita'potakihpi áakitapiyookim ohkitsim*
 annahk M kam-**ikaa**-omatoos**i** omi ot-ita'potakihpi áak-itapiyooki-m o-kitsim
 DEM M if-PERF-leave.VAI-SBJ:3 DEM 3-workplace FUT-lock.VTI-3:0 3-door

'If Martina **has left** her office, she will have locked her door.'

Antecedent Proposition	Felicity
Future: $t_0 < \tau(e)_{\text{ANTC}}$	✓
Past Perfective: $\tau(e)_{\text{ANTC}} \subseteq t_{\text{iPAST}}$	✗
Present Perfect: $\tau(e)_{\text{ANTC}} < t_0$	✓

Blackfoot SUBJUNCTIVE conditionals can also be used to hypothesize about events that might presently be in progress. This is shown by the examples in (342) and (343) - the addition of the imperfective *á-* allows the eventive predicates to be interpreted as present, and the SUBJUNCTIVE form of the conditional is used.¹⁷²

172. The example in (343) has the morpheme *sa:ki-* "still" in addition to the imperfective. Note, however, that it is likely the *á-*, and not *sa:ki-*, that affects the temporal structure of the predicate. When *sa:ki* is used temporally, as in (343), it never occurs without the imperfective. *sa:ki-* can also be used to convey (non-temporal) focus-sensitivity, like parallel uses of English *still*. In these cases, *sa:ki-* occurs without the imperfective.

- (342) **Context:** Meagan is such a bad dancer that watching her dance should be avoided at all costs. Beatrice is walking into a party where she knows Meagan might be, and tells herself:

kamáihpiyisi, nitáakomatapoo
 kam-á-ihpiyi-si, nit-áak-omatapoo
 if-**IMPF**-dance.VAI-**SBJ:3**, 1-FUT-leave.VAI
 'If she's dancing, I'm gonna go.'

- (343) **Context:** Amelia has tricked me into thinking that our term paper has to be 50 pages long. Last she saw, I was writing frantically. Amelia and you are walking back to the department now, and you figure:

annahk Meagan kamsakiaisinaakisi, annahk Amelia
 annahk Meagan kam-sa:ki-á-sinaaki-si annahk Amelia
 DEM Meagan if-still-**IMPF**-write.VAI-**SBJ:3** DEM Amelia
áaksstonnatsikahsi'taki
 áak-sstonnat-ikahsi'taki-wa
 FUT-really-laugh.VAI-3
 'If Meagan is still writing, Amelia will really laugh.'

The examples in (344) and (345) show that **SUBJUNCTIVE** conditionals can also be used to hypothesize about present states.

- (344) **Context:** We're discussing clichés, and I reason that pigs are so heavy that if they had wings, they wouldn't be able to fly anymore than ostriches can.

ááksiniksi kamóminníisa máátáaksaakyohkottsipawanítwaiksaa
 aiksini-iksi kam-ominnii-si-yaa máát-áak-sa:ki-ohkott-ipawaani-waiksaa
 pig-PL if-have-wings.VAI-**3:SBJ-3pl** NEG-FUT-still-ABLE-fly.VAI-nonaff:3pl
 'If pigs had wings, they still would not be able to fly.'

- (i) **Context:** My sister is a food snob, and we're having a discussion about what constitutes cooking. We're watching a Food Network show, where the cooking includes opening a can and microwaving the contents. My sister complains that the show is not really about cooking, and to be perverse, I point out that the celebrity chef is still cooking (even if it's really unimpressive).

sáákioyo'si
 sa:ki-oyo'si-wa
 still-cook.VAI-3
 'She's still cooking.'

- (345) **Context:** I want to buy a dog, but the guy at the petshop keeps trying to sell me cats, fish, ferrets, etc. Finally he brings out one last animal, and I say:

kamomitáasi, nitáakohpommata
 kam-omitaa-**si** nit-áak-ohpomaat-a
 if-dog-3:**SBJ** 1-FUT-buy.VTA-1:3
 'If it's a dog, I'll buy it.'

The example in (346) shows that SUBJUNCTIVE conditionals can also be used to hypothesize about present habits.

- (346) **Context:** Katerina has always sworn that she'll never date a smoker. Patrick, the guy she's seeing, has been forewarned about this and is pretending that he doesn't smoke. She suspects this though, and tells him: "If you smoke, I'll break up with you!"

kamáó'tsisíniki, máátáakattohpoka'poomotsiiyó'pa
 kam-á-o'tsisi-**iniki**, máát-áak-matt-ohpok-a'p-oo::m-otsii-ó'p-wa
 if-IMPf-SMOKE.vai-**SBJ:LOC**, NEG-FUT-add-ASSOC-around-go-acomp-recip.vai-21-LOC:NONAFF
 'If you smoke, I'm not gonna go out with you anymore.'

The data presented before can be summarized as in Table 5.3.1.

Antecedent	Temporal Interpretation	Felicity
"Future"	$t_0 < \tau(e)_{\text{ANTC}}$	✓
Past Perfective	$\tau(e)_{\text{ANTC}} \subseteq t_i \text{PAST}$	✗
Present Perfect	$\tau(e)_{\text{ANTC}} < t_0$	✓
Present In-Progress	$\tau(e)_{\text{ANTC}} \circ t_0$	✓
Present Stative	$s_{\text{ANTC}} \circ t_0$	✓

Table 5.3: The Felicity of SUBJUNCTIVE Conditional Antecedents

From the table we can see that whereas SUBJUNCTIVE conditionals are acceptable when their antecedent proposition speculates about a future or present situation, they are not acceptable when they speculate about a past situation. This is not, however, a pragmatic restriction on whether the real-world situation is present, past or future, but a grammatical restriction. We can speculate about a past situation, as long as that past situation is grammatically represented as a *present perfect* situation.

These temporal restrictions are exactly what we would expect if (i) the main clause modal takes the present tense t_0 as its temporal perspective and (ii) SUBJUNCTIVE conditional antecedents are temporally interpreted with respect to the main clause modal's temporal perspective, as assumed in the previous section. Recall from chapters 2 and 4 that Blackfoot's present tense t_0 is instantaneous (cf. Reis Silva & Matthewson (2008)), and that eventive predicates, being inherently dynamic

and thus longer than an instant, are incompatible with the present tense. Any eventive predicate in the antecedent of a *SUBJUNCTIVE* conditional interpreted with respect to t_0 must first be modified by a stativizing element like the imperfective *á-*, the perfect *ikaa-* or a null prospective aspect. This covers the range of temporal interpretations associated with eventive *SUBJUNCTIVE* antecedents: present in-progress interpretations with the imperfective *á-*, present perfect interpretations with the perfect *ikaa-*, and bare “future” (present prospective) interpretations with a null prospective aspect. Stative predicates in the antecedent of a *SUBJUNCTIVE* conditional interpreted with respect to t_0 lack the inherent dynamicity of an eventive and hence do not require any further aspectual modification to be interpreted with respect to the instantaneous present temporal perspective.

If the explanation above is on the right track, then we expect the temporal restrictions on *SUBJUNCTIVE* conditional antecedents to be dependent on the main clause modal taking the present tense t_0 as its temporal perspective. In the following subsection I show that the temporal restrictions on *SUBJUNCTIVE* conditionals do not hold when a non-instantaneous time of evaluation is overtly specified, or contextually given.

***SUBJUNCTIVE* Distribution: Main Clause TP=Past**

As mentioned previously, stative elements in Blackfoot are compatible with both past and present temporal interpretations, unless a past time interval is made contextually salient, the default interpretation is present. The conditionals in question are all licensed by the presence of the circumstantial modal *áak-* in the main clause/consequent, where I argued in chapter 4 that *áak-* is stative-like in terms of the range of temporal perspective times it allows. Given this, we can make the following prediction: by making a past time of evaluation contextually salient, the *SUBJUNCTIVE* conditional can be interpreted with respect to the (non-instantaneous) variable t_{IPAST} , and the *SUBJUNCTIVE* antecedent can therefore be interpreted as (past) perfective. The data in (347) and (348) support this prediction. The contexts given in these examples are such that we are not considering a present time of evaluation, but a past one. For instance, if we consider (347), it is certainly no longer the case that the only avenue people in China have of getting to Canada is via boat. To make the inference expressed by (347), a speaker would rather be taking into account the circumstances and general laws that applied during the 1950s. The time of evaluation is thus not the instantaneous present t_0 , but the salient past interval during which such circumstances/laws held.

- (347) **Context:** We’re talking about my dad. You’re surprised to learn that he was born in China, because he is very westernized. You reason that if he was born in China, and is yet so westernized, he must have come here very young - so young, in fact, that planes were not yet available.

kamítsipo'ka'sisi *áápamohtsi* *áakohto'too* *iihtayáákyohso'pi*
 kam-it-ipo'kaa-si-si waapam-ohtsi áak-oht-o'too-wa iihtayaakyohso'pi
 if-RL-be.born.VAI-?-**SBJ:3** across.ocean-loc **FUT**-source-arrive.VAI-3 boat

'If he was born in China, he would have come over in a boat.'

- (348) **Context:** We just finished listening to a podcast about D. B. Cooper, who is famous for having, some 40 years ago, hijacked a plane, demanded lots of money, and parachuted out of the plane without the pilots having noticed. He was never caught, and the majority of the money he extorted from the FBI was also never found. There are a lot of people who have claimed to be, or to have known D. B. Cooper since then, but since the conditions in which he jumped out from the plane were really dangerous - there was a storm, and no good landing place, I think these are a pack of lies, stating:

kamínnoohpai'pisi *áaksi'ni*
 kam-inn-ohpai'piyi-si áak-i'ni-wa
 if-down-jump.VAI-**SBJ:3** **FUT**-die.VAI-3

'If he had jumped, he would be dead.'

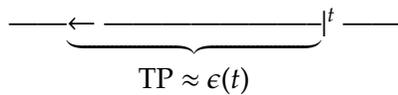
If we accept that the main clauses/consequents in (347) and (348) are interpreted with past temporal perspectives, along with our assumption that conditional antecedents are temporally-indeterminate propositions that are evaluated with respect to the main clause modal's temporal perspective time, we predict that the aspectually-unmarked **SUBJUNCTIVE** conditional antecedents can be interpreted as perfective. That is, we expect that the aspectually-unmarked antecedents in (347) and (348) can describe events contained within a salient past interval, as is the case. There is no need for an overt perfect *ikaa-* in order to obtain a reading where the antecedent event precedes t_0 . This contrasts with the examples seen in the previous subsection, where the absence of overt aspect must be interpreted as representing a null prospective aspect, since a perfective interpretation is incompatible with the instantaneous t_0 . In those cases, an overt perfect *ikaa-* is required in order to obtain a reading where the antecedent event precedes t_0 .

Note that under the logic we have been using, we would also predict that **SUBJUNCTIVE** conditionals headed by non-stative-like modals like the ability modal *ohkott-*, would not display the previously observed temporal restriction. This is because non-stative-like modals like *ohkott-* are always interpreted with respect to a past temporal perspective, whether or not a past temporal interval has been made contextually or linguistically salient. However, as we have already seen in the first part of this chapter, the ability modal *ohkott-* fails to license ontic conditional antecedents in general; we thus cannot test their temporal restrictions.

Temporal Perspective and Evidential Conditionals

The analysis of the temporal restrictions on *SUBJUNCTIVE* conditionals is dependent on the temporal perspective of the main clause modal. So what do we predict for evidential conditionals, where the main clause modal is a null (or overt) epistemic modal? In chapter 4 I argued that epistemic modals involve quantification over hypotheses. I then suggested that the temporal perspective of Blackfoot epistemic modals reflects this. A hypothesis has to account for the evidence gathered within a particular time period; I proposed that the temporal perspective of Blackfoot epistemic modals correlates with this time interval. Because the nature of evidence is cumulative (in the sense that prior evidence is not discountable) I proposed that the time period in question is a past-unbounded interval.

(349) Proposed Temporal Perspective time for Epistemic Modals:



Where ϵ is the function that takes a time, t ,
and yields the past-unbounded interval right-demarcated by t .

The temporal perspective for an evidential claim is thus never instantaneous, which means that an evidential conditional antecedent should not be subject to the temporal restrictions we saw previously. That is, the absence of overt aspect can always be interpreted as perfective, and an interpretation where the antecedent event precedes t_0 therefore does not require the perfect *ikaa-*. The data below show that the generalisation is, in fact, that *SUBJUNCTIVE* conditional antecedents associated with evidential conditionals do not appear to show the previously observed temporal restriction; the aspectually unmarked conditional antecedents in (350) can be interpreted as having preceded t_0 without the overt perfect *ikaa-*.

(350) **Context:** Piitaakii, an enemy spy, has infiltrated our camp, stolen information, and escaped. We're trying to figure out (i) how she infiltrated our camp (e.g., which way she came from), and (ii) where she's going, so that we can catch her. We find a scrap of her shirt, where we see a spaghetti sauce stain, which looks and smells like the sauce from a famous restaurant in the north. We conclude:

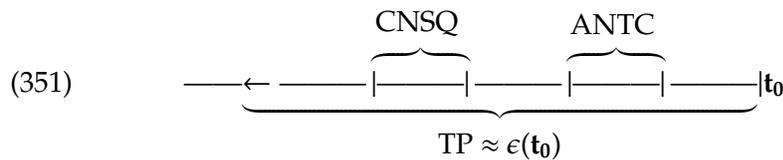
- a. *kamitóoyo'sisi* *omi itóoyo'pi, iihto'too* *pinaapohtsi*
 kam-it-ooyo'si-si omi itóoyo'pi, iiht-o'too-wa pinaap-ohtsi
 if-RL-prepare.meal.VAI-SBJ:3 DEM restaurant, source-arrive.VAI-3 north-direction

'If she ate at that restaurant, she came from the north.'

- b. *kamitóoyo'sisi* *omi itóoyoo'pi, aahkoohto'too*
 kam-it-ooyo'si-si omi itóoyoo'pi, aahk-ooht-o'too-wa
 if-RL-prepare.meal.VAI-SBJ:3 DEM restaurant, EPIST-source-arrive.VAI-3
pinaapohtsi
 pinaap-ohtsi
 north-direction

'If she ate at that resturant, she must have come from the north.'

The temporal properties of (350) can be broken down as follows: I assume that the evidential conditional in (350a) is licensed by a null universal epistemic modal \emptyset_{EPIST} , which takes t_0 as its evaluation time. Unlike what is the case for circumstantial modals, t_0 does not directly correlate with the time restricting the facts in \emptyset_{EPIST} 's evidential modal base. Rather, because of the cumulative nature of evidence, t_0 instead demarcates a past-unbounded interval, $\epsilon(t_0)$. This is the time interval that the temporally-indeterminate antecedent (*itóoyo'si* "have a meal at that restaurant") is interpreted with respect to. This is also the time interval that \emptyset_{EPIST} 's temporally-indeterminate prejacent (*ihhto'too pinaapohtsi* "come from the North") is interpreted with respect to. As both of these temporally-indeterminate propositions are aspectually unmarked, we predict that they will be interpreted as containing a null perfective aspect - i.e., both events will be interpreted as being contained within $\epsilon(t_0)$.¹⁷³ This is illustrated in (351).



(350a) can be analyzed in the same manner; the only difference is that the modal that licenses the conditional antecedent is the overt epistemic modal *aahk-*, as opposed to \emptyset_{EPIST} . Note that there is no restriction on whether the runtime of the antecedent event precede the consequent event, or vice versa. Given the context in (350), it is likely that the consequent event precedes the antecedent event. Another example of an evidential conditional is given in (352), however, where either order of antecedent and consequent is possible. As is the case in (350a,b), the SUBJUNCTIVE conditional antecedent is morphologically unmarked for aspect and interpreted as preceding t_0 . As before, I assume that this reading is derived by interpreting the antecedent as having been modified by a null perfective aspect, so that the antecedent event is interpreted as being contained within $\epsilon(t_0)$. The context is one where the consequent (*ihhto'too nimmohtsi tsaahto isskihtao'ohtsi* "go west or east") describes an event that could either precede or follow the antecedent event (*ikamotsii ponokaomitaa* "steal a horse").

173. Why can't these be interpreted with the null prospective aspect? In chapter 6 I argue that the null prospective aspect has particular licensing conditions that the epistemic modals \emptyset_{EPIST} and *aahk-* fail to satisfy. This is why the only available interpretation is perfective.

(352) **Context:** We're bugging her friend's phone, and when Piitaaki contacts her friend, we listen in on the phone call, and it sounds like we can hear a horse in the background. There are only stables in the west and east, so we figure:

- a. *kamííkamo'tsisi* *ponokaomitaa, iihto'too* *nimmohtsi* *tsaahto*
 kam-ikamosat-yii-si ponokaomitaa, iiht-o'too-wa nimm-ohtsi tsaahto
 if-steal.VTA-3:3'-SBJ:3 horse, source-arrive.VAI-3 west-direction or
isskihtao'ohtsi
 isskihtao'-ohtsi
 east-direction

"If she stole a horse, she went west or east."

- b. *kamííkamo'tsisi* *ponokaomitaa, aahkohto'too* *nimmohtsi*
 kam-ikamosat-yii-si ponokaomitaa, aahk-ooht-o'too-wa nimm-ohtsi
 if-steal.VTA-3:3'-SBJ:3 horse, EPIST-source-arrive.VAI-3 west-direction
tsaahto isskihtao'ohtsi
 tsaahto isskihtao'-ohtsi
 or east-direction

'If she stole a horse, she must have gone west or east.'

The difference between the correlation of times for conditionals headed by action-dependent circumstantial modals and the correlation of times for conditionals headed by hypothesis-dependent epistemic modals is very slight. In both cases, the temporal perspective time, antecedent evaluation time and preajacent evaluation time map onto a single time. However, in the case of action-dependent circumstantial modals, this single time correlates directly to the variable, t , that the modal's λt operator binds. For hypothesis-dependent epistemic modals, the time correlates to a past-unbounded interval right-demarcated by that variable, $\epsilon(t)$. This is schematized in figure 5.3 and figure 5.4 respectively.

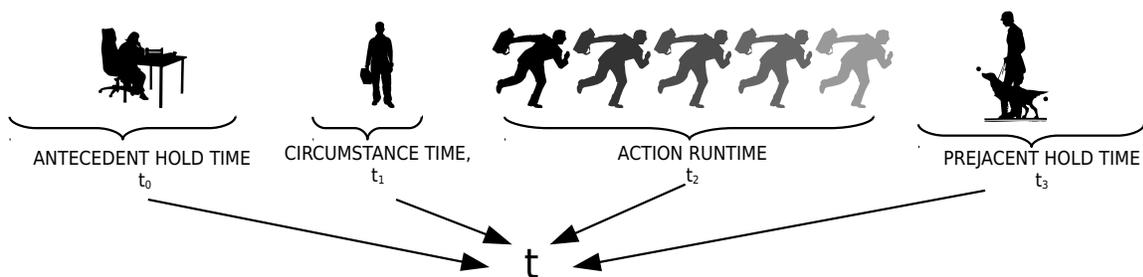


Figure 5.3: Action-Dependent Circumstantial Modals: Times Correlate with t

The reader should note, however, that the temporal properties of Blackfoot evidential conditionals have not yet been thoroughly investigated. For example, I am uncertain as to whether a context which forces the antecedent event to precede the consequent event would be felicitously

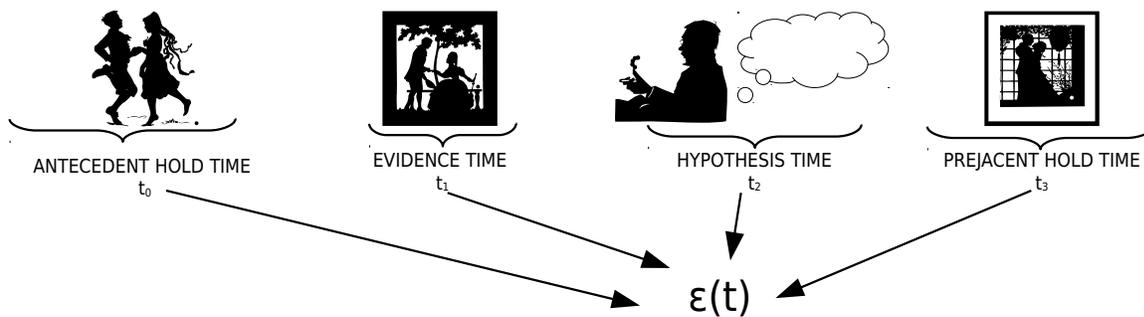


Figure 5.4: Hypothesis-Dependent Epistemic Modals: Times Correlate with $\epsilon(t)$

described by an evidential conditional. This would mean that the antecedent need not describe direct evidence of the consequent event, but could describe evidence that allows one to conclude the inevitability of the consequent event. I leave this issue for future research. In the next section I discuss how to formalize our observations regarding ontic SUBJUNCTIVE conditional antecedents with present temporal perspectives.

5.3.2 Formalizing the SUBJUNCTIVE

In this section, I discuss how the observed temporal restrictions on SUBJUNCTIVE conditional antecedents can be reflected in terms of the SUBJUNCTIVE 's grammatical properties.

Recall from chapter 2 that the Blackfoot SUBJUNCTIVE clause-type morphology differs from the INDEPENDENT, CONJUNCTIVE and UNREAL clause-type morphology in that it never co-occurs with the person proclitics, instead encoding its own person/number features:

Clause-Type Morphology	SUBJUNCTIVE
1ST person	-iniki
2ND person	-iniki
1ST person pl	-inaaniniki
2ND person pl	-inoaainiki
3RD person (sg/pl)	-si
1ST PL INCLUSIVE	-'ki / -hki

Table 5.4: SUBJUNCTIVE Morphology

Following Ritter & Wiltschko (2004, 2009)'s Person-based syntactic hierarchy for Blackfoot, Bliss (2013) proposes that the Blackfoot person proclitics are situated in the specifier of Blackfoot's functional equivalent of Infl, Person. The Infl/Pers node has an uninterpretable person feature, [$uPers$]. In order for this feature to be checked, the person prefixes, nit -1st, kit -2nd, \emptyset/ot -3rd merge into Infl/PersP's specifier position. Given this sort of framework, the observation regarding the

SUBJUNCTIVE morphology's incompatibility with the person prefixes can be incorporated into Bliss (2013)'s syntactic framework for Blackfoot in at least two ways.

The first method would be to re-frame the SUBJUNCTIVE morphology as the head of Infl. Instead of having uninterpretable person features, however, it has interpretable person features which don't require checking, and hence don't require the person prefixes (*nit-*, *kit-*) to merge. The second method would be to treat the SUBJUNCTIVE morphology as merging in the specifier of Infl/PersP, in place of the person prefixes, to check some uninterpretable person feature on Infl/Pers. As the first method is more reflective of the general pattern in Blackfoot, whereby functional heads appear to the left of the verb stem, and specifiers/modifiers appear to the right, I will assume the first method as conceptually more attractive. We can then posit the following denotations for Blackfoot SUBJUNCTIVE morphology (abstracting away from the singular/plural distinction), where SUBJUNCTIVE morphology is truth-conditionally vacuous; its only function is to provide the interpretable features required for a successful syntactic derivation.¹⁷⁴

(353) Blackfoot SUBJUNCTIVE Morphology

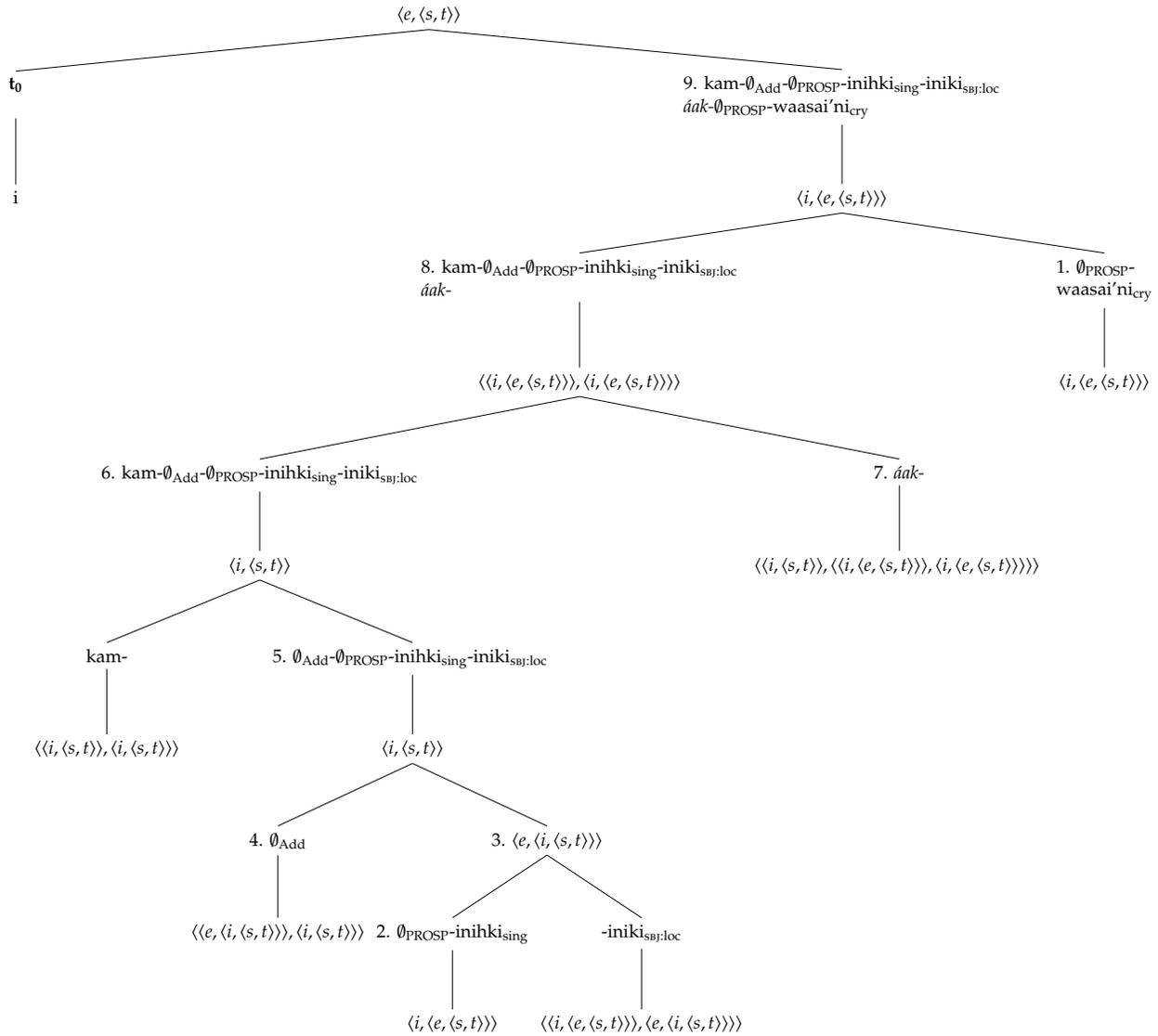
- a. $\llbracket -iniki \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda x. \lambda t. \lambda w. P(x, t, w)$
 $\phi Feature: [Loc:Pers]$ (to check [*u*Pers])
- b. $\llbracket -si \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda x. \lambda t. \lambda w. P(x, t, w)$
 $\phi Feature: [3:Pers]$ (to check [*u*Pers])
- c. $\llbracket -'ki \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda x. \lambda t. \lambda w. P(x, t, w)$
 $\phi Feature: [21:Pers]$ (to check [*u*Pers])

With this sort of denotation, the SUBJUNCTIVE morphology takes an element of type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$ but yields an element of type $\langle e, \langle i, \langle s, t \rangle \rangle \rangle$ - i.e., an element which requires an individual argument, and then yields a temporally-indeterminate proposition. This allows an individual argument (e.g., in the form of a null pronoun) to merge with the conditional antecedent. This is necessary because the subject of the antecedent clause needn't be the same as the subject of the consequent clause. After this individual argument merges, the yielded temporally-indeterminate proposition is incorporated in the main clause modal's circumstantial modal base. The temporally-indeterminate proposition denoted by the conditional antecedent, along with the temporally-indeterminate properties in the main clause modal's circumstantial modal base, and the main clause modal's temporally-indeterminate complement property, are then interpreted with respect to a single evaluation time. Recall that the only temporal restriction arose in cases where where (i) no past temporal interval

174. The 1st and 2nd person plural forms *-inaaniniki* and *-inoaaainiki* look morphologically decompositional; versions of the *-inaan* and *-inoaa* forms are also present in the 1st and 2nd plural forms of the INDEPENDENT and CONJUNCTIVE forms *hpinaana/-hpoaawa* and *hsinaani/hsoaayi* respectively.

is made linguistically or contextually-salient, and (ii) the conditional is a causal/ontic one, and the restriction was that a SUBJUNCTIVE antecedent cannot be interpreted as preceding t_0 without the overt presence of the perfect *ikaa-*. In these cases, I have argued that the single evaluation time is t_0 , as shown in the composition tree below.¹⁷⁵

- (354) *kaminihkiiniki, áakaasai'ni*
kam-inihki-iniki, áak-waasai'ni-wa
 if-sing.VAI-SBJ:LOC, FUT-cry.VAI-3
 "If you sing, she₁ will cry."



1. $[[\emptyset_{\text{PROSP-waasai'ni}}]_{\text{cry}}]^{h,c} =$
 $\lambda t. \lambda x. \lambda w : \exists P \in \text{CRY}. \exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, t', x, w)] \& t < t']$

175. I leave the issue of specifying the semantics of the preverbal morpheme *kam-* for further research.

The consequent modal's prejacent: a temporally-indeterminate property (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$) that contains prospective aspect. This temporally-indeterminate property is true of a world, individual, and time, w, x, t , when there is an event with runtime t' , where t' follows t , and x sees to it that x cries by t' .

2. $\llbracket \emptyset_{\text{PROSP-ihki}_{\text{sing}}} \rrbracket^{h,c} =$
 $\lambda t. \lambda x. \lambda w : \exists p \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(p, t', x, w)] \ \& \ t < t']$

The antecedent without conditional marking: a temporally-indeterminate property (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$) that contains prospective aspect. This temporally-indeterminate property is true of a world, individual, and time, w, x, t , when there is an event with runtime t' , where t' follows t , and x sees to it that x sings by t' .

3. $\llbracket \emptyset_{\text{PROSP-ihki}_{\text{sing}}-\text{iniki}_{\text{SBj:loc}}} \rrbracket^{h,c} =$
 $\lambda x. \lambda t. \lambda w : \exists p \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(p, t', x, w)] \ \& \ t < t']$
 $\phi_{\text{Feature}}: [\text{LOC:Pers}]$ (to check [u Pers])

The antecedent with SUBJUNCTIVE marking: a property that yields a temporally-indeterminate proposition (type $\langle e, \langle i, \langle s, t \rangle \rangle \rangle$): This property is true of a world, time, and individual, w, t, x , when there is an event with runtime t' , where t' follows t , and x sees to it that x sings by t' .

Syntactic Restriction: x must have the ϕ feature [LOC:Pers] - i.e., x must include the speaker or addressee.

4. $\llbracket \emptyset_{\text{Add}} \rrbracket^{h,c} = \lambda P_{\langle e, \langle i, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda w. P(h(\text{Add}), t, w)$

A null pronoun to satisfy the individual argument of the antecedent property: The assignment function assigns this variable to the individual correlating to the Addressee in c .

Syntactic Feature Checked: The Addressee in c has the ϕ feature [LOC:Pers], satisfying the syntactic feature restriction.

5. $\llbracket \emptyset_{\text{Add}}-\emptyset_{\text{PROSP-ihki}_{\text{sing}}-\text{iniki}_{\text{SBj:loc}}} \rrbracket^{h,c} =$

$$\lambda t. \lambda w : \exists p \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(p, t', h(\text{Add}), w)] \ \& \ t < t']$$

$\phi_{\text{Feature}}: [\text{LOC:Pers}]$

(to check [u Pers])

The antecedent with SUBJUNCTIVE marking and its person argument fulfilled by a null pronoun: A temporally-indeterminate proposition (type $\langle i, \langle s, t \rangle \rangle$) that is true of a world and time, w, t , when there is an event with runtime t' , where t' follows t , and the Addressee in c sees to it that he or she sings by t' .

6. $\llbracket \emptyset_{\text{Add}} - \emptyset_{\text{PROSP}} - \text{inihki}_{\text{sing}} - \text{iniki}_{\text{SBj:loc}} \rrbracket^{\text{h,c}} =$ (abstracting away from *kam-*)
 $\llbracket \text{kam} - \emptyset_{\text{Add}} - \emptyset_{\text{PROSP}} - \text{inihki}_{\text{sing}} - \text{iniki}_{\text{SBj:loc}} \rrbracket^{\text{h,c}} =$
 $\lambda t. \lambda w : \exists P \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(\text{Add}), w, t')] \ \& \ t < t']$
 $\phi_{\text{Feature}}: [\text{LOC:Pers}]$ (to check [*uPers*])

Abstracting away from the semantics of *kam-*: Same as above

7. $\llbracket \acute{a}ak- \rrbracket^{\text{h,c}} = \lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle}. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$
 $\forall w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \ \& \ w' \in \cap \{Y : Y \in C^+(r, x, w, t)_{\leq G(w, t)}\}]]] \rightarrow P(x, w', t)$
 where
 $C^+ =$
 $\lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda t. \lambda x. \lambda w. \{Y | Y \subseteq C(x, w, t) \cup \{r(t)\} \ \& \ r(t) \in Y \ \& \ \cap Y(t) \neq \emptyset \ \& \ \neg \exists X [X \subseteq C(x, w, t) \ \& \ r(t) \in X \ \& \ \cap X(t) \neq \emptyset \ \& \ Y \subset X]\}$

The semantics of *áak-*: A function from temporally-indeterminate propositions to a modifier of temporally-indeterminate properties (type $\langle \langle i, \langle s, t \rangle \rangle, \langle \langle i, \langle e, \langle s, t \rangle \rangle \rangle, \langle i, \langle e, \langle s, t \rangle \rangle \rangle \rangle$).

This is true of a world, individual, time, temporally-indeterminate property and temporally-indeterminate proposition, w, x, t, P, r , if all of the bouletically highest-ranked actions available to x in w at t are actions such that for each set of propositions, Y , where Y (i) contains the proposition that x instantiates the action a in w' at t and (ii) is a maximally-consistent subset of the set of propositions that are compatible with x 's circumstances in w at t that also contains the antecedent proposition, $r(t)$, the worlds compatible with Y (that are also highest-ranked by a stereotypical ordering source) are worlds, w' , where P holds true of x in w' at t .

8. $\llbracket \text{kam} - \emptyset_{\text{Add}} - \emptyset_{\text{PROSP}} - \text{inihki}_{\text{sing}} - \text{iniki}_{\text{SBj:loc}} \ \acute{a}ak- \rrbracket^{\text{h,c}} =$
 $\lambda P_{\langle i, \langle s, t \rangle \rangle}. \lambda t. \lambda x. \lambda w : \exists P \in \text{SING}. \forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$
 $\forall w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \ \& \ w' \in \cap \{Y : Y \in C^+((\lambda t. \lambda w. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(\text{Add}), w, t')] \ \& \ t < t')], x, w, t)_{\leq G(w, t)}\}]]] \rightarrow P(x, w', t)$
 where
 $C^+((\lambda t. \lambda w. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(\text{Add}), w, t')] \ \& \ t < t')], x, w, t) =$
 $\lambda t. \lambda s. \lambda w. \{Y | Y \subseteq C(x, w, t) \cup r(w, t) \ \& \ r(w, t) \in Y \ \& \ \cap Y \neq \emptyset \ \& \ \neg \exists X [X \subseteq C(x, w, t) \ \& \ r(w, t) \in X \ \& \ \cap X(t) \neq \emptyset \ \& \ Y \subset X]\}$
 (and $r = \lambda t. \lambda w. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(\text{Add}), w, t')] \ \& \ t < t']$)

with the perfect *ikaa-*. This accounts for the temporal restrictions on SUBJUNCTIVE conditional antecedents.

What about cases where SUBJUNCTIVE conditional antecedents lack the above temporal restriction? In the case of ontic conditionals where an overt past temporal interval is made contextually salient, the conditional antecedent is interpreted with respect to t_{iPAST} . Because t_{iPAST} ranges over intervals, and not instants, the lack of overt aspect can be interpreted as perfective aspect, and the antecedent can be interpreted as being contained within t_{iPAST} . In the case of evidential conditionals, merging t_0 as the temporal argument to \emptyset_{EPIST} or *aahk-* doesn't correlate to a semantics where t_0 provides the temporal perspective time. Rather it results in a semantics where t_0 demarcates the right-edge of a past-unbounded temporal perspective time $\epsilon(t_0)$. As $\epsilon(t_0)$, like t_{iPAST} , ranges over intervals and not instants, the absence of overt aspect can be interpreted as perfective aspect, and the antecedent can be interpreted as being contained within $\epsilon(t_0)$.

An obvious question that arises at this point is whether the proposed denotations for the SUBJUNCTIVE agreement morphemes can also account for the other uses of Blackfoot's SUBJUNCTIVE paradigm. Frantz (1991, 2009) describes Blackfoot SUBJUNCTIVE morphology as being used for (i) suppositional antecedents (as above), (ii) future *when*-clauses, and (iii) *whenever*-clauses.¹⁷⁶ Conditional antecedents occur with the morpheme *kam-*, future *when*-clauses occur with the morpheme *á'-* (glossed "inchoative"), and *whenever*-clauses occur with *kana-*, a form of the universal quantifier

176. Frantz (1991, 2009) does not specify what he means by "suppositional." I have taken it to mean any conditional antecedent whose truth-value is not known to be either true or false. That is, conditional antecedents that are not counterfactual, including conditional antecedents not already known to be true.

ohkan-^{177,178,179,180} The examples of future *when*-clauses, and *whenever*- clauses are taken from Frantz (1991, 2009) (but glossed according to my conventions).

(355) Future *when*-clauses (Frantz (2009):111)

- a. *áó'tooyiniki* *áakitsoyo'pa*
á'-o'too-iniki *áak-it-Ioyi-o'pa*
 inch-arrive.VAI-SBJ:LOC FUT-RL-eat.VAI-21
 'When you/I arrive, then we'll eat.'
- b. *ai'sóótaasi,* *áakitsipimmiyiaawa*
á'-sootaa-si *áak-it-ipiM-yi-aawa*
 inch-ran.VAI-SBJ:3 FUT-RL-enter.VAI-3pl-DTP
 'When it rains, they will go in.'

(356) *Whenever*- clause (Frantz (2009):111)

- kanáísootaasi,* *itáípimma*
kana-á-sootaa-si, *it-á-IpiM-wa*
 all-IMPF-rain.VAI-SBJ:3, rl-IMPF-enter.VAI-3
 'Whenever it rains, he goes in.'

177. The conditional antecedent *kam-* form is also used for complement Y/N questions. Further investigation of the semantics of Blackfoot complement clauses is required before much can be said about the use of SUBJUNCTIVE morphology in these cases.

178. Frantz (1991, 2009) lists *kam-* as *ikkam-*. My consultant consistently uses the form *kam* however.

179. Frantz (1991, 2009) notes that future *when*-clauses additionally have the spatio-temporal linker *it-* in the main clause (cf. Frantz 1991, 2009). See Bliss (2013) for an analysis of *it-*. Although Frantz (1991, 2009) describes past *when*-clauses as taking CONJUNCTIVE morphology (along with the "inchoative" *á'-*), I have found data that suggests that the SUBJUNCTIVE VS CONJUNCTIVE distinction in *when* clauses might correlate more with an eventive/non-eventive, as opposed to past-nonpast distinction. The following are examples of past in-progress *when*-clauses and the *when*-clauses are marked with the SUBJUNCTIVE:

(i) **Context:** When I was younger, I was always slower than my older sisters getting ready in the morning.

- a. *amohk isskoohtsik á'yáyo'kainiki* *anníksis nínsstsiiksi átssiskíttsiyaa*
amohk isskoohtsik á'-á-yo'kaa-iniki *ann-iksi-s n-insst-iksi á-ssisskiitsi-yi-aawa*
 DEM long.ago inch-IMPF-sleep.VAI-SBJ:LOC DEM-pl-? 1-sister-PL IMPF-wash.face.VAI-3pl-DTP

'In the past, when I was sleeping, my sisters would be washing their faces.'

- b. *amohk isskoohtsik á'yássisskiitsiniki* *anníksis nínsstsiiksi*
amohk isskoohtsik á'-á-ssisskiitsi-iniki *ann-iksi-s n-insst-iksi*
 DEM long.ago inch-IMPF-wash.face.VAI-SBJ:LOC DEM-pl-? 1-sister-PL

akáíksista'ksa'pskoohsiiyaa
akaa-iksist-a'ksa'pskoohsii-yi-aawa
 PERF-finish-get.dressed.VAI-3pl-DTP

'In the past, when I was washing my face, my sisters would already be dressed.'

- c. *amohk isskoohtsik ayáya'ksa'pskoohsiniki,* *anníksis nínsstsiiksi ákoomatapa'pioyiyaa*
amohk isskoohtsik á'-á-a'ksa'pskoohsii-iniki, *ann-iksi-s n-insst-iksi akaa-omatap-a'p-Ioyi-yi-aawa*
 DEM long.ago inch-IMPF-get.dressed.VAI-SBJ:LOC DEM-pl-? 1-sister-PL PERF-begin-eat.VAI-3pl-DTP

'In the past, when I was getting dressed, my sisters would be starting to eat.'

180. The *kana-* form usually occurs with nominals, while the *ohkan-* form occurs with verbs.

According to the denotations proposed, SUBJUNCTIVE morphology takes something of type $\langle e, \langle i, \langle s, t \rangle \rangle \rangle$ and yields something of type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$ - i.e., it yields an element that maps from the domain of times to another domain. Its use to form temporal adverbials like future *when* and *whenever* clauses is thus not surprising; elements like these plausibly restrict times via something like Predicate Modification. Further fieldwork investigation into the morphemes *kam-*, *á'-*, and *kana-* is required before a fully compositional account can be given, however. I leave this for future research.

5.3.3 Blackfoot UNREAL Conditional Antecedents

In this section I show that Blackfoot UNREAL conditional antecedents are restricted in their temporal interpretation. This restriction correlates with the counterfactual/non-counterfactual status of the antecedent: while non-counterfactual antecedents can only be interpreted as past, counterfactual antecedents are temporally unrestricted. I first discuss the temporally-restricted (non-counterfactual) cases, and then discuss the temporally-unrestricted (counterfactual) cases.

UNREAL Distribution: Non-Counterfactual

UNREAL conditionals are usually translated with English past perfect “If I had...” forms. Correspondingly, they are often used for counterfactual reasoning. They are not restricted to counterfactual reasoning, however. Recall that Blackfoot UNREAL conditionals are often used to speculate about possible (i.e., non-counterfactual) past events, as shown previously in (340). The relevant examples are repeated below in (357) and (358), where we see that the SUBJUNCTIVE conditional is infelicitous, but the UNREAL conditional felicitous.

- (357) **Context:** My sister was running in a race yesterday. I haven’t heard whether she won or not yet, but I hope she did, because if she won, we’ll eat cake to celebrate.

kamomo'tsaakisi matónni nitáakitsoyihpinnaan pisátsskiitaan
kam-omo'tsaaki-si matonni nit-áak-it-Ioyi-hpinnaan pisatsskiitaan
if-win.VAI-SBJ:3 yesterday 1-FUT-RL-eat.VAI-1PL.EXCL cake

'Target: If she won yesterday, we will eat cake.'

- (358) **Context:** My sister was running in a race yesterday. I haven’t heard whether she won or not yet, but I hope she did, because if she won, we’ll eat cake to celebrate.

íimotsaaki'ohtopi matónni nitáakitsoyihpinnaan pisátsskiitaan
ii-omo'tsaaki-ohtopi matonni nit-áak-it-Ioyi-hpinnaan pisatsskiitaan
ic-win.VAI-UNR yesterday 1-FUT-RL-eat.VAI-1PL.EXCL cake

'If she won yesterday, we will eat cake.'

This shows that Blackfoot UNREAL conditionals do not map perfectly onto English past perfect conditionals, as English past perfect conditionals are infelicitous in the context above.

The use of UNREAL antecedents to speculate about possible (as opposed to counterfactual) situations is temporally restricted however. If the antecedent describes a future or present situation, the UNREAL form is unacceptable. This is shown for future-interpreted antecedents in (359) and (360). In (359) I am speculating about a possible future event in which I steal my sister's apples, and the use of the UNREAL is unacceptable.

(359) **Context:** My sister has been cultivating these apples which look really delicious. I know she doesn't want them to be eaten yet, but I'm really hungry...

nitsíisaykamo'saata'ohtopi oma apasstaaminaam, nókowaan
 nit-ii-sa-ikamo'saata-ohtopi om-wa apasstaaminaam, n-okowaan
 1-ic-NEG-steal.VTA-UNR DEM-3 apple, 1-stomach
áakitomatapohtako
 áak-it-omatap-oh tako-wa
 FUT-rl-start-sound.VAI-3

'# If I **hadn't** stolen that apple, my stomach **would have** started sounding.'

Target: If I don't steal that apple, my stomach will start growling.

Similarly, if I am considering the consequences of the future possibility of my lactose-intolerant brother drinking milk, an UNREAL conditional like (360) is unacceptable.

(360) **Context:** I am getting revenge on my brother, and have to make sure he goes to the bathroom. I figure I have this covered, because my brother is hilariously lactose-intolerant.

iisimiohtopi ónnikis, áakotoisapiohsi
 ii-simi-oh topi onnikis, áak-oto-isapiohsi
 ic-drink.VAI-UNR milk, FUT-go.to-have.the.runs.VAI

'If he had drunk milk, he would have had the runs.'

Target: If he drinks milk, he'll have the runs.

A SUBJUNCTIVE conditional must be used in the contexts in (359) and (360). This is shown in (361) and (362) below.

- (361) **Context:** My sister has been cultivating these apples which look really delicious. I know she doesn't want them to be eaten yet, but I'm really hungry...

kamsaykamo'saata'iniki oma apasstaaminaam, nókowaan
 kam-sa-ikamo'saata-**iniki** om-wa apasstaaminaam, n-okowaan
 if-NEG-steal.VTA-**SBJ:LOC** DEM-3 apple, 1-stomach
áakitomatapohtako
áak-it-omatap-ohtako-wa
 FUT-rl-start-sound.VAI-3

'If I don't steal that apple, my stomach will start sounding.'

- (362) **Context:** I am getting revenge on my brother, and have to make sure he goes to the bathroom. I figure I have this covered, because my brother is hilariously lactose-intolerant.

kamsskai'simisi ónnikis, áakotoisapiohsi
 kam-sska'-simi-**si** onnikis, áak-oto-isapiohsi
 if-alot-drink.VAI-**SBJ:3** milk, FUT-go.to-have.the.runs.VAI

'If he drinks a lot of milk, he will have the runs.'

The data in (363) shows that an UNREAL conditional is unacceptable in a context where the antecedent speculates about a present possibility that may turn out to be true (i.e., a non-counterfactual present possibility).

- (363) **Context:** My dog is whining at you, and you ask me if you should feed him. Since my dog is unhealthily obese, and should only really eat if he's hungry, I tell you: If he's hungry, you should feed him.

ísttso'kinihtopi, kitáakoohksíisowa
 isttso'kini-**ohtopi**, kit-áak-noohk-yiiso-a-wa
 hungry.VAI-**UNR**, 2-c.exp-feed.VTA-1:3-3

'# If he had been hungry, you should feed him.'

(363) shows that if we are speculating about my dog possibly being hungry at the time of utterance, an UNREAL is infelicitous. A SUBJUNCTIVE like (364) must be used instead. If the context were such that I knew that my dog was faking his hunger, on the other hand, (363) would be felicitous.

- (364) **Context:** My dog is whining at you, and you ask me if you should feed him. Since my dog is unhealthily obese, and should only really eat if he's hungry, I tell you: If he's hungry, you should feed him.

l kamísttso'kinisi, kitáakoohksíisowa
 isttso'kini-**si**, kit-áak-noohk-yiiso-a-wa
 hungry.VAI-**SBJ:3**, 2-c.exp-feed.VTA-1:3-3

'If he's hungry, you should feed him.'

To summarize, although Blackfoot UNREAL conditionals are translated with English past perfect “If I had...” conditionals, they do not have the same distribution as English past perfect “If I had...” conditionals in that the Blackfoot UNREAL antecedents are the default way to express speculation about past (non-counterfactual) possibilities. I have shown, however, that the use of UNREAL antecedents to speculate about non-counterfactual possibilities is temporally restricted: non-counterfactual suppositions can only be interpreted as past. In the following section I show that counterfactual uses of UNREAL antecedents lack this temporal restriction.

UNREAL Distribution: Counterfactual

If an UNREAL antecedent hypothesizes about a situation known to be incompatible with w_0 - i.e., if the UNREAL antecedent is counterfactual - there are no restrictions on its temporal interpretation. The interpretation can be past, as in (365), which speculates about an unrealized past possibility wherein my brother learned about his pet frog’s demise.

- (365) **Context:** When my brother was very young, his pet frog got sucked up the filter. Because he was a very sensitive child, we told him the frog went back to live with its family. If we had told him then, he would have been very upset.

iisskssiniiohtopi annihk omáánista’pihpi áaksikohtsawahsi’taki
 ii-sksiniM-**ohtopi** annihk om-aanist-a’pii-hp-yi áak-ikaa-oht-saw-yaahs-i’taki
 ic-know.VTI-UNR then 3-manner-happen.VII-CJ-0 FUT-PERF-SOURCE-NEG-good-feel.VAI
 ‘If he **had known** what happened at that time, it **would have** made him feel really bad.’

The example in (366) is another example of this type - here I am speculating about what would have happened if I hadn’t stolen my sister’s apple - i.e., I am speculating about what would have happened, if a past counterfactual event had taken place. In this context, an UNREAL is used.

- (366) **Context:** I stole and ate my sister’s apple, but failed to get rid of all of the evidence, and got busted. But I’m unrepentant:

nitsíisaykamo’saata’ohtopi oma apasstaaminaam nókowaan
nit-ii-sa-ikamo’saata-ohtopi om-wa apasstaaminaam n-okowaan
 1-ic-NEG-steal.VTA-UNR DEM-3 apple 1-stomach
áakitomatapoh tako
áak-it-omatap-oh tako-wa
 FUT-rl-start-sound.VAI-3

‘If I **hadn’t** stolen that apple, my stomach **would’ve** started sounding.’

UNREAL conditional antecedents can also be used to speculate about future or present counterfactual situations as well, however. A future-interpreted UNREAL conditional antecedent is given in (367); although this would be unacceptable if it were possible for me to win the contest, it is

allowed in the given context as I am not a contestant and it is thus impossible for me to win the contest.¹⁸¹

- (367) **Context:** My brother is participating in a contest, and brags that he will buy lots of food with the prize money. I think this is a waste of prize-money, and even though I’m not a contestant, I speculate on what I would buy with the prize-money.

nitsíimo'tsaakyo' ohtopi, nitáakohpomm ponokáómitaa
nit-ii-omo'tsaaki-ohtopi, nit-áak-ohpommaa ponoka-aomitaa
 1-ic-win.VAI-UNR, 1-FUT-buy.VAI elk-dog

'If I should win, I would buy a horse.'

An example of a present-interpreted UNREAL antecedent is given in (368).

- (368) **Context:** We're discussing clichés, and I reason that pigs are so heavy that if they had wings, they wouldn't be able to fly anymore than ostriches can.

áiksiniksi imínni' ihtopi, máátáksaakyohkottsipawanítwaiksaa,
aiksiniki-iksi ii-ominnii-htopi, máát-áak-sa:ki-ohkott-ipawaani-waiksaa
 pig-PL if-have-wings.VAI-UNR NEG-FUT-still-ABLE-fly.VAI-nonaff:3pl

'If pigs had wings, they still would not be able to fly.'

The table in 5.5 summarizes the distribution of UNREAL conditionals in a relatively pretheoretical way ("future," "present" and "past"). Recall, however, that the system for temporality proposed in chapter 2 is one where there are only two tenses available: $\emptyset_{\text{PRESENT}}$ and \emptyset_{PAST} , which map onto the instantaneous temporal variable t_0 and the non-instantaneous temporal variable t_{PAST} respectively. According to the proposed framework then, there is thus no such thing as a future tense, future interpretations being constructed via the contribution of null prospective aspect. This means that the "future" interpreted antecedents must be analyzed as involving a null prospective aspect.

Table 5.5: The Distribution of UNREAL Conditionals: First Pass

Non-Counterfactual Antecedent	Felicity
Past	✓
Future	×
Present	×
Counterfactual Antecedent	Felicity
Past	✓
Future	✓
Present	✓

181. As is the case for most of the data I present, the translation given is provided by my consultant. I do not have this use of *should* in my dialect of English, and am uncertain as to how this *should* patterns in my consultant's English.

As was the case for SUBJUNCTIVE conditionals, the “past” cases pattern distinctly from the “present” and “future” cases. I suggest, as I did for the SUBJUNCTIVE case, and as is required by the system for Blackfoot temporality set up in chapter 2, that the “future” antecedents be formalized as present prospective antecedents. This allows us to subsume the future and present cases together as cases involving \mathbf{t}_0 as the temporal perspective time. This is represented in table 5.6.

Table 5.6: The Distribution of UNREAL Conditionals: Second Pass

Non-Counterfactual Antecedent P	Felicity
P($\mathbf{t}_{\text{IPAST}}$)	✓
P(\mathbf{t}_0)	×
Counterfactual Antecedent P	Felicity
P($\mathbf{t}_{\text{IPAST}}$)	✓
P(\mathbf{t}_0)	✓

5.3.4 Formalizing the Analysis: UNREAL

I propose that Blackfoot UNREAL morphology imposes a non-coincidence presupposition in the spirit of Iatridou (2000) - i.e., the UNREAL morphology *-htopi* presupposes that the temporally-indeterminate antecedent proposition, P, is such that $\langle \mathbf{w}_0, \mathbf{t}_0 \rangle$ is not a member of the set $\{ \langle w, t \rangle | P(w, t) \}$. A preliminary denotation is as follows:

(369) Blackfoot UNREAL Morphology: Preliminary Denotation

$$\llbracket -htopi \rrbracket^{\text{h,c}} = \lambda P_{\langle i, \langle s, t \rangle \rangle} . \lambda t . \lambda w : \forall \langle w', t \rangle [P(w', t) \rightarrow \langle w', t \rangle \neq \langle \mathbf{w}_0, \mathbf{t}_0 \rangle] . P(w, t)$$

The proposed denotation for UNREAL morphology is truth-conditionally vacuous beyond the presupposition that for all evaluation world-time pairs $\langle w, t \rangle$ where the antecedent, P, holds true, are not $\langle \mathbf{w}_0, \mathbf{t}_0 \rangle$. This presupposition can be satisfied in (at least) two ways. The first way is to ensure that P is temporally specified so that it cannot hold true of \mathbf{t}_0 . That is, if P has been modified by the null perfective aspect, P can only hold true of an interval like $\mathbf{t}_{\text{IPAST}}$; it cannot hold true of \mathbf{t}_0 . This ensures that none of the $\langle w, t \rangle$ pairs where the antecedent, P, holds true, are $\langle \mathbf{w}_0, \mathbf{t}_0 \rangle$. Note that this does not rule out $\langle \mathbf{w}_0, t' \rangle$ (where $t' \neq \mathbf{t}_0$, e.g., $\langle \mathbf{w}_0, t' \rangle = \langle \mathbf{w}_0, \mathbf{t}_{\text{IPAST}} \rangle$) from being a world-time pair where the antecedent proposition, P, holds true. That is, it could be the case that \mathbf{w}_0 is a world where there is an event of the type described by the antecedent contained within the salient past time interval that contextually binds $\mathbf{t}_{\text{IPAST}}$. This correlates with our observations that UNREAL conditionals can be used to speculate about possible past events, as we saw in the case of the UNREAL conditional (358) translated as “If she won yesterday, we will eat cake.” It may also be the case, however, that none of the worlds where P($w, \mathbf{t}_{\text{IPAST}}$) holds true are candidates for being the actual world, \mathbf{w}_0 . That is, it may be the case that the interlocutors know there is *not* an event of the type described by the antecedent contained within the salient past time interval that binds $\mathbf{t}_{\text{IPAST}}$. This correlates with our observations that UNREAL conditionals can be used to speculate about counterfactual past events, as we saw was the case for the UNREAL conditionals in

(365) and (366), which translate into the past perfect conditionals “If he had known about what happened, he would have felt bad” and “If I hadn’t stolen that apple, my stomach would have started growling” respectively.

Table 5.7: The Distribution of UNREAL Conditionals: $t = \mathbf{t}_{\text{IPAST}}$ ($\mathbf{t}_{\text{IPAST}} \neq \mathbf{t}_0, \therefore \mathbf{w}_0 = w$ or $\mathbf{w}_0 \neq w$)

$P(w, \mathbf{t}_{\text{IPAST}})$	Felicity
Possible	✓
Counterfactual	✓

Note that in the non-counterfactual use of the UNREAL conditional (e.g., “If she won the race yesterday, we’ll eat cake”), the antecedent and consequent appear to be interpreted with respect to distinct evaluation times. That is, while the UNREAL antecedent is interpreted with respect to a non-present evaluation time (the antecedent is past perfective), the consequent appears to be interpreted with respect to a present evaluation time (present prospective). This suggests that unlike SUBJUNCTIVE conditionals, where the antecedent and consequent share the temporal perspective time as their temporal evaluation time, UNREAL conditional antecedents can be interpreted with respect to an evaluation time different from the consequent’s temporal perspective time. I thus suggest the revised denotation below, which existentially quantifies over contextually-salient times at which the antecedent proposition holds true.¹⁸²

(370) Blackfoot UNREAL Morphology: Revised Denotation

$$\llbracket \text{-htopi} \rrbracket^{\text{h,c}} = \lambda P_{\langle i, \langle s, t \rangle \rangle} . \lambda t . \lambda w : \forall \langle w', t \rangle [P(w', t) \rightarrow \langle w', t \rangle \neq \langle \mathbf{w}_0, \mathbf{t}_0 \rangle] . \exists t' \in \mathcal{T}(c) [P(w, t')]$$

Let \mathcal{T} be a function that takes a context and yields the set of times recently made salient.

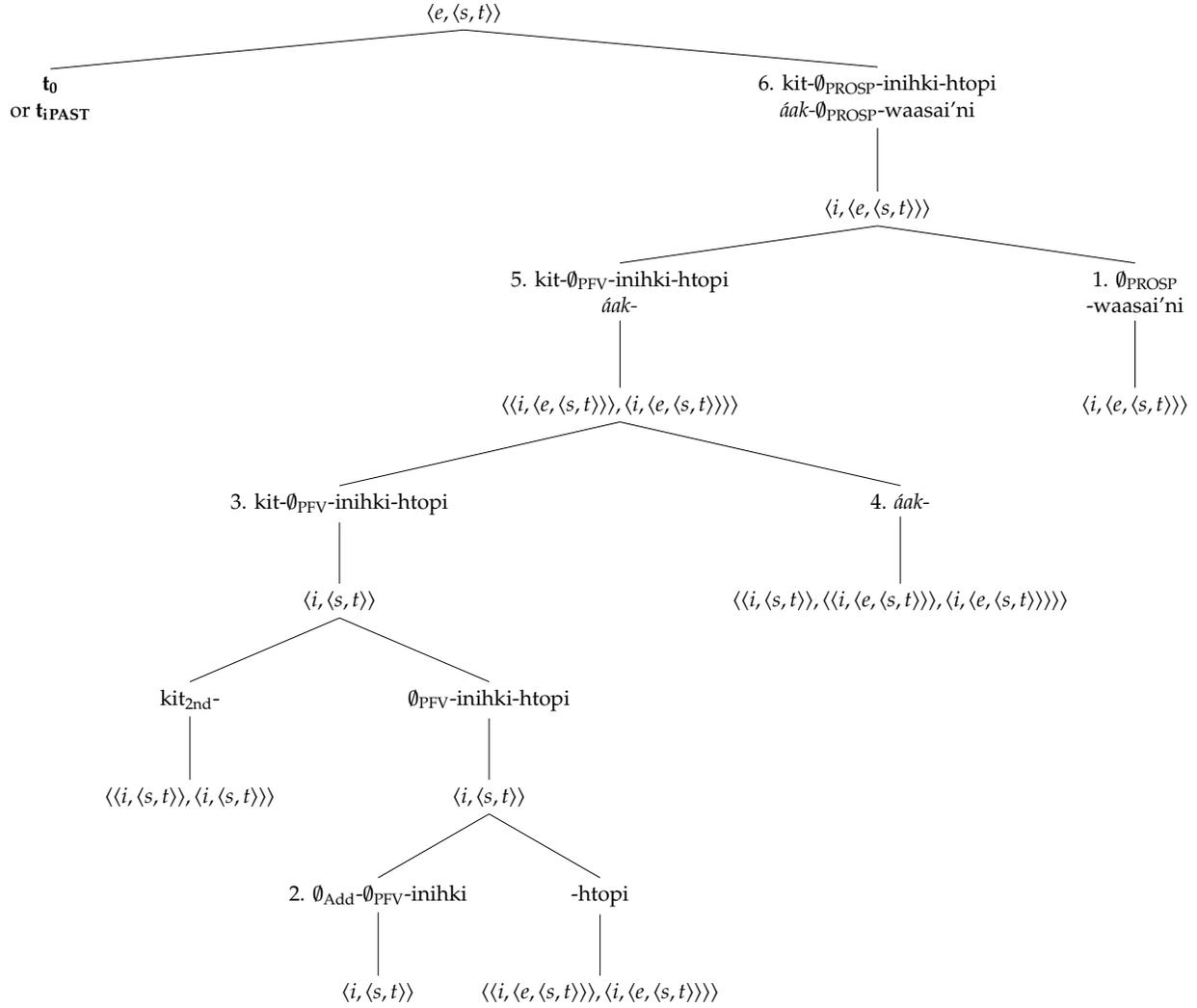
The tree in (371) shows the basic composition of an UNREAL conditional where the bare UNREAL antecedent is interpreted as being modified by null perfective aspect. The two possible translations reflect the two possible readings - cases where the antecedent describes an epistemically possible past situation, and cases where it describes a counterfactual past situation.

(371) *kitsinihki'ihtopi, áakaasai'ni*
 kit-inihki-htopi áak-waasai'ni-wa
 2-sing.VAI-UNR FUT-cry.VAI-3

Reading 1: “If you sang, she₁ will cry.”

Reading 2: “If you had sung, she₁ would have cried.”

182. The lambda binder λt is vacuous as the formula lacks a t variable. In order to maintain the assumption that *áak*-uniformly takes antecedents of type $\langle i, \langle s, t \rangle \rangle$, however, I have kept this λt in the denotation.



1. $\llbracket \emptyset_{\text{PROSP}}\text{-waasai'ni}_{\text{cry}} \rrbracket^{h,c} =$
 $\lambda t. \lambda x. \lambda w : \exists p \in \text{CRY}. \exists t' [\exists e [\tau(e) = t' v_{\text{stit}}(p, x, w, t')] \& t < t']$

The consequent modal's prejacent: a temporally-indeterminate property (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$) that contains prospective aspect. This temporally-indeterminate property is true of a world, individual, and time, w, x, t , when there is an event with runtime t' , where t' follows t , and x sees to it that x cries by t' .

2. $\llbracket \emptyset_{\text{Add}}\text{-}\emptyset_{\text{PFV}}\text{-inihki}_{\text{sing}} \rrbracket^{h,c} =$
 $\lambda t. \lambda w : \exists p \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(p, h(\text{Add}), w, t')] \& t' \subseteq t]$

The antecedent without conditional morphology: a temporally-indeterminate proposition (type $\langle i, \langle s, t \rangle \rangle$) that contains perfective aspect. This temporally-indeterminate proposition is true of a world and time, w, t , when there is an event with runtime t' , where t' is contained in t , and the Addressee in c sees to it that he or she sings by t' .

3. $[[\emptyset_{\text{PFV-inihki}_{\text{sing-htopi}}}]^{\text{h,c}} =$
 $[[kit - \emptyset_{\text{PFV-inihki}_{\text{sing-htopi}}}]^{\text{h,c}} =$ (Assuming *kit*- agrees with a null 2nd person pronoun)
 $\lambda t. \lambda w : \exists P \in \text{SING} \& \forall \langle w, t \rangle [P(w, t) \rightarrow \langle w, t \rangle \neq \langle \mathbf{w}_0, \mathbf{t}_0 \rangle]. \exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, h(\text{Add}), w, t')] \& t' \subseteq t'']] =$
 $\lambda t. \lambda w : \exists P \in \text{SING} \& \forall \langle w, t \rangle [\exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, h(\text{Add}), w, t')] \& t' \subseteq t'']] \rightarrow$
 $\langle w, t \rangle \neq \langle \mathbf{w}_0, \mathbf{t}_0 \rangle]. \exists t'' [\exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, h(\text{Add}), w, t')] \& t' \subseteq t'']] =$
Presupposition: $\forall \langle w, t \rangle [\exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, h(\text{Add}), w, t')] \& t' \subseteq t'']] \rightarrow$
 $\langle w, t \rangle \neq \langle \mathbf{w}_0, \mathbf{t}_0 \rangle]$ (where $P \in \text{SING}$)

The antecedent property with UNREAL marking: a temporally-indeterminate proposition (type $\langle i, \langle s, t \rangle \rangle$): This is true of a world and time, w, t , when there is an event with runtime t' , where t' is contained within t , and the Addressee in c sees to it that he or she sings by t' .

Presupposition: \approx None of the $\langle w, t \rangle$ pairs, such that w has a singing event by the Addressee contained in the contextually-salient time t , are identical to $\langle \mathbf{w}_0, \mathbf{t}_0 \rangle$. Because the perfective is incompatible with \mathbf{t}_0 as an evaluation time, this presupposition is already ensured as $t \neq \mathbf{t}_0$. This means the antecedent can be either an epistemic possibility, or it can be counterfactual.

4. $[[\acute{a}ak-]^{\text{h,c}} = \lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$
 $[\forall w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \& w' \in \cap \{Y : Y \in C^+(r, x, w, t)_{\leq G(w, t)}\}]]]] \rightarrow P(x, w', t)]$
 where
 $C^+ =$
 $\lambda r_{\langle i, \langle s, t \rangle \rangle}. \lambda t. \lambda x. \lambda w. \{Y | Y \subseteq C(x, w, t) \cup \{r(t)\} \& r(t) \in Y \& \cap Y(t) \neq \emptyset \& \neg \exists X [X \subseteq C(x, w, t) \& r(t) \in X \& \cap X(t) \neq \emptyset \& Y \subset X]\}$

The semantics of $\acute{a}ak-$: A function from temporally-indeterminate propositions to a modifier of temporally-indeterminate properties (type $\langle \langle i, \langle s, t \rangle \rangle, \langle \langle i, \langle e, \langle s, t \rangle \rangle \rangle, \langle i, \langle e, \langle s, t \rangle \rangle \rangle \rangle$).

This is true of a world, individual, time, temporally-indeterminate property and temporally-indeterminate proposition, w, x, t, P, r , if all of the bouletically highest-ranked actions available to x in w at t are actions such that for each set of propositions, Y , where Y (i) contains the proposition that x instantiates the action a in w' at t and (ii) is a maximally-consistent subset of the set of propositions that are compatible with x 's circumstances in w at t that also contains the antecedent proposition, $r(t)$, the worlds compatible with Y (that are also highest-ranked by a stereotypical ordering source) are worlds, w' , where P holds true of x in w' at t .

5. $[[kit - \emptyset_{\text{PFV-inihki}_{\text{sing-htopi}}}]^{\text{h,c}} \quad \acute{a}ak-]^{\text{h,c}} =$
 $\lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$
 $[\forall w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \& w' \in \cap \{Y : LY \in C^+((\lambda t. \lambda w : \exists P \in \text{SING}. \exists t'' \in \mathcal{T}(c)$
 $[\exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, h(\text{Add}), w, t')] \& t' \subseteq t'']])], x, w, t)_{\leq G(w, t)}\}]]]] \rightarrow P(x, w', t)]$

where

$$C^+((\lambda t. \lambda w. \exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(Add), w, t')] \ \& \ t' \subseteq t'']]), x, w, t) = \lambda t. \lambda s. \lambda w. \{Y | Y \subseteq C(x, w, t) \cup r(w, t) \ \& \ r(w, t) \in Y \ \& \ \cap Y \neq \emptyset \ \& \ \neg \exists X [X \subseteq C(x, w, t) \ \& \ r(w, t) \in X \ \& \ \cap X(t) \neq \emptyset \ \& \ Y \subset X]\}$$

(and $r = \lambda t. \lambda w : \exists P \in \text{SING}. \exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(Add), w, t')] \ \& \ t' \subseteq t'']]$)

The semantics of *áak*- restricted by the conditional antecedent in 3: A function from temporally-indeterminate properties to temporally-indeterminate properties.

This is true of a world, individual, time, and temporally-indeterminate property, w, x, t, P , if all of the bouletically highest-ranked actions available to x in w at t are actions such that for each set of propositions, Y , where Y (i) contains the proposition that x instantiates the action a in w' at t and (ii) is a maximally-consistent subset of the set of propositions that are compatible with x 's circumstances in w at t that also contains the antecedent proposition, $\lambda t. \lambda w : \exists P \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(Add), w, t')] \ \& \ t \subseteq t']$ (*The Addressee in c sees to it that he/she sings at some time t' contained in t*), the worlds, w' , compatible with Y (that are also highest-ranked by a stereotypical ordering source) are worlds where P holds true of x in w' at t .

Presupposition: \approx None of the $\langle w, t \rangle$ pairs, such that w has a singing event by the Addressee contained in the contextually-salient time t , are identical to $\langle w_0, t_0 \rangle$. Because the perfective is incompatible with t_0 as an evaluation time, this presupposition is already ensured as $t \neq t_0$. This means the antecedent can be either an epistemic possibility, or it can be counterfactual.

$$6. \llbracket \textit{kit} - \emptyset_{\text{PFV}}\text{-inihki}_{\text{sing}}\text{-htopi} \quad \textit{áak}\text{-}\emptyset_{\text{PROSP}}\text{-waasai'ni}_{\text{cry}} \rrbracket^{\text{h,c}} =$$

$$\lambda t. \lambda x. \lambda w : \exists P \in \text{SING}, \exists P' \in \text{CRY}. \forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} [\forall w' [\forall Y [w' \in [\lambda w' [R(a, x, w', t) \ \& \ w' \in \cap \{Y : Y \in C^+((\lambda t. \lambda w. \exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(Add), w, t')] \ \& \ t' \subseteq t'']]), x, w, t)_{\leq G(w, t)}\}]]]] \rightarrow \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P', x, w', t')] \ \& \ t < t']]$$

where

$$C^+((\lambda t. \lambda w. \exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(Add), w, t')] \ \& \ t' \subseteq t'']]), x, w, t) = \lambda t. \lambda s. \lambda w. \{Y | Y \subseteq C(x, w, t) \cup r(w, t) \ \& \ r(w, t) \in Y \ \& \ \cap Y \neq \emptyset \ \& \ \neg \exists X [X \subseteq C(x, w, t) \ \& \ r(w, t) \in X \ \& \ \cap X(t) \neq \emptyset \ \& \ Y \subset X]\}$$

(and $r = \lambda t. \lambda w. \exists t'' \in \mathcal{T}(c) [\exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(Add), w, t')] \ \& \ t' \subseteq t'']]$)

The semantics of *áak*- taking the temporally-indeterminate property, 1, as its prejacent, further restricted by the conditional antecedent in 5: A temporally-indeterminate property (type $\langle i, \langle e, \langle s, t \rangle \rangle \rangle$).

This is true of a world, individual, and time, w, x, t , if all of the bouletically highest-ranked actions available to x in w at t are actions such that for each set of propositions, Y , where Y (i) contains the proposition that x instantiates the action a in w' at t and (ii) is a maximally-consistent subset of the set of propositions that are compatible with x 's circumstances in w at t that also contains the antecedent proposition, $\lambda t. \lambda w : \exists P \in \text{SING}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P, h(\text{Add}), w, t')] \ \& \ t \subseteq t']$ (*The Addressee in c sees to it that he/she sings at some time t' contained in t*), the worlds, w' , compatible with Y (that are also highest-ranked by a stereotypical ordering source) are worlds where the temporally-indeterminate property, $\lambda t. \lambda x. \lambda w : \exists P' \in \text{CRY}. \exists t' [\exists e [\tau(e) = t' \ \& \ v_{\text{stit}}(P', x, w', t')] \ \& \ t < t']$, holds true of x in w' at t - i.e., x sees to it that she cries at some time, t' , that follows t .

Presupposition: \approx None of the $\langle w, t \rangle$ pairs, such that w has a singing event by the Addressee contained in the contextually-salient time t , are identical to $\langle w_0, t_0 \rangle$. Because the perfective is incompatible with t_0 as an evaluation time, this presupposition is already ensured as $t \neq t_0$. This means the antecedent can be either an epistemic possibility, or it can be counterfactual.

In cases where the consequent is interpreted with respect to a present evaluation time (i.e., when the main/consequent clause modal has a present temporal perspective), the composition at this point combines with t_0 . In cases where it is interpreted with respect to a past evaluation time (i.e., when the main/consequent clause has a past temporal perspective), the composition at this point combines with t_{PAST} .

What about cases where the antecedent *can* be interpreted with respect to t_0 ? That is, what about cases where P represents a stative predicate, or an eventive predicate stativized by means of the null prospective aspect? In these cases, the presupposition that $\langle w_0, t_0 \rangle \neq \langle w, t \rangle$ is not automatically satisfied by the temporal restrictions on the temporally-indeterminate antecedent proposition. The presupposition has to be satisfied by the context. There are two logical possibilities for this. The first option is that it must be known that w_0 is not one of the worlds such that $P(w, t_0)$ holds true - i.e., $P(w_0, t_0)$ is known to be false/counterfactual. This correlates with our observation that if the antecedent is known to be counterfactual, it can be interpreted with a prospective temporal orientation, as in (367), or a present/coinciding temporal orientation, as in (368).

The second logical possibility is that it must be known that t_0 is not a time such that $P(w_0, t)$ holds true. Consider first the case where P represents an eventive predicate modified by the null prospective aspect. If a present prospective interpretation of P must be false (as t_0 is not one of the times such that $P(w_0, t)$ holds true), then a possible future interpretation is ruled out. This correlates with our observation that hypotheses about epistemically possible "future" (i.e., present prospective) and present situations cannot be expressed with UNREAL conditionals, as illustrated by the infelicity of the present prospective cases in (359) and (360). Note that a (non-counterfactual) past prospective interpretation is not ruled out. The requirement that the present, t_0 is not a

time that prospective claim holds true of, however, rules out past prospective interpretations where the runtime of the antecedent event follows t_0 . This rules out (non-counterfactual) future interpretations even when the antecedent's evaluation time is not t_0 .

(372) Past Prospective Interpretations of the Antecedent



The case where P represents a stative predicate is much the same. If it is known that t_0 is not a time such that $P(w_0, t)$ holds true, then present stative UNREAL examples like (363) can only be used in contexts where the antecedent is known to be counterfactual.

Table 5.8: The Distribution of UNREAL Conditionals: $t = t_0(w_0 \neq w)$

$P(w_0, t_0)$	Felicity
Possible	✗
Counterfactual	✓

5.3.5 Section Summary

In this section I presented previously undocumented empirical generalisations regarding the distribution of SUBJUNCTIVE and UNREAL conditionals. I showed that SUBJUNCTIVE conditional antecedents are restricted in their temporal interpretations, although these restrictions are conditioned by the consequent modal's temporal perspective. I argued that the temporal restrictions are exactly what we would predict given our previously-motivated assumptions that (i) conditional antecedents are evaluated with respect to the consequent modal's temporal perspective (see sections 5.1.3 and 5.2.2, this chapter) and (ii) the assumption that Blackfoot's present tense is instantaneous (see chapters 2, 4 and Reis Silva & Matthewson (2008).) I additionally showed that UNREAL conditional antecedents are restricted in their temporal interpretation, and that these restrictions are conditioned by the counterfactual/non-counterfactual status of the antecedent. I proposed an Iatridou (2000)-inspired analysis for UNREAL conditionals whereby UNREAL morphology presupposes non-coincidence between the evaluation world-time pair $\langle w, t \rangle$ and the deictic world-time pair $\langle w_0, t_0 \rangle$.

5.4 Chapter Summary and Reflections

In this chapter I addressed two basic questions about Blackfoot conditionals. The first question I addressed was: "In what contexts are Blackfoot conditionals licensed?" I then showed that ontically-interpreted conditional antecedents in Blackfoot are subject to strict licensing conditions - they require a particular kind of modal in their consequent. More specifically, while the modals

áak-“will” and *aahkama’p*- “might” are sufficient to license ontically-interpreted antecedents, the ability modal *ohkott*- fails to license them. I argued that the licensing/non-licensing modals are semantically characterizable in terms of their temporal orientations: only modals that allow the antecedent to temporally precede the consequent license ontic antecedents. This reflects the basic intuition that a cause must temporally precede its effect. That the main clause modal’s temporal orientation reflects the temporal relation between the antecedent and consequent of a conditional followed from the assumption that a conditional antecedent is temporally interpreted with respect to the same time as the consequent’s temporal perspective time.

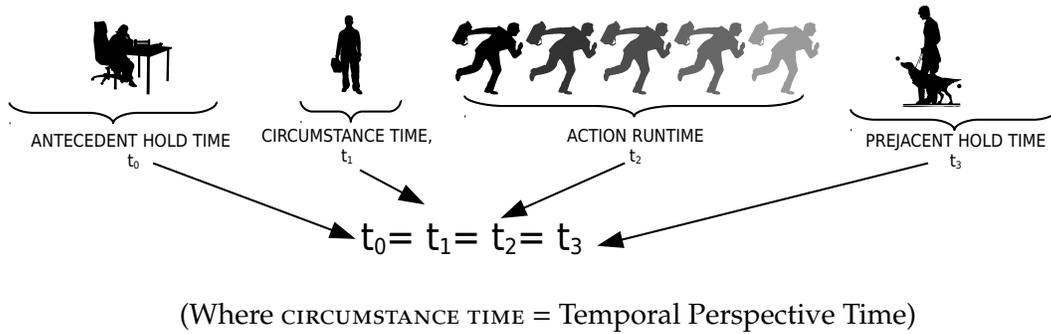


Figure 5.5: Correlation of Times for a Blackfoot Circumstantial Conditional

This assumption is an extension of the major temporal claim I make regarding Blackfoot circumstantial modal claims - i.e., that all relations and predicates within a Blackfoot circumstantial modal’s denotation are temporally interpreted with respect to a single evaluation time, as per the diagram in 5.6.

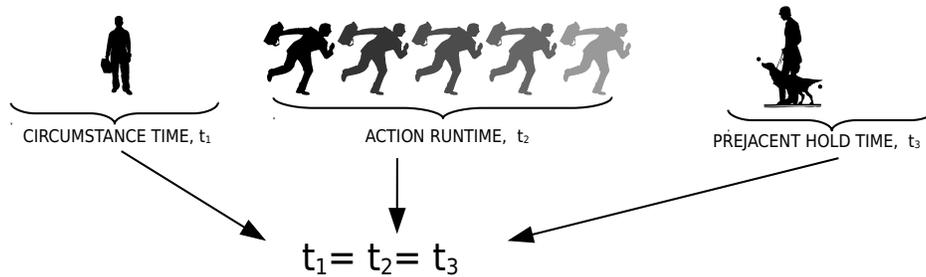


Figure 5.6: Correlation of Times for a Blackfoot Circumstantial Claim

The inability of *ohkott*- to license ontic antecedents lies in its perfective containment temporal orientation, where this particular temporal orientation is a necessary consequence of the action-dependent approach to *ohkott*-’s agentivity requirement presented in chapter 4.

The second question I addressed was: “What is the semantic reflex of SUBJUNCTIVE VS UNREAL morphology in the conditional antecedent?” I argued that the temporally-restricted distribution of

SUBJUNCTIVE conditionals is in fact predicted from previously-made assumptions regarding (i) how a conditional antecedent restricts a modal claim and (ii) the instantaneous nature of Blackfoot’s present tense. An important observation is that the empirical generalisations discussed above are restricted to ontic conditionals. In the analysis for conditionals I have proposed, ontic conditionals are licensed by action-dependent circumstantial modals while evidential conditionals are licensed by epistemic modals. In chapter 4 I proposed that epistemic modals in Blackfoot differ from circumstantial modals in that they uniformly have non-instantaneous temporal perspectives. As both of the analyses presented in this chapter rely on what the temporal perspective of the main-clause modal is, it is not surprising that evidential conditionals behave differently than ontic conditionals.

One important issue that has not been addressed is as follows: How is the ontic condition implemented in the semantic system. Given the compositional semantics I have proposed, wherein aspects introduce a reference time and either universally or existentially quantify over the time variable correlating with $\tau(e)$, how can a restriction on $\tau(e)$ be stated? In order to solve this issue, I suggest compositional system where aspects do not immediately quantify over the temporal argument correlating to $\tau(e)$. Rather, this temporal argument a variable bound by a lambda operator λi until the end of the composition, wherein this variable is subject to existential closure.

$$(373) \quad \llbracket \emptyset_{\text{PROSP}} \rrbracket^{h,c} = \lambda P. \lambda t. \lambda x. \lambda i. \lambda w. P(i, x, w) \& t < i \quad (\text{where } i \text{ correlates with } \tau(e) \text{ - i.e., the })$$

This leaves a temporal argument correlating to the runtime of the event open for modification and restriction. The conditional modal base C^+ , for instance, may impose the ontic condition as a presupposition that for ontic conditionals, $t < i$. Such a system would require that all of the aspects and modals systematically be modified in terms of their type so that they include an additional open temporal variable and a λi operator to bind this temporal variable. As this does not affect any other parts of the analyses I propose, in order to maintain consistency in the system proposed across chapters, I will continue with the original formalization I proposed wherein the temporal argument correlating to $\tau(e)$ is subject to existential closure.

Throughout this chapter (chapter 5) and chapter 4 I have assumed the availability of a null prospective aspect in Blackfoot. This is a necessity given my chapter 4 analysis of Blackfoot *áak-*“will” as an action-dependent circumstantial modal with no independent temporal meaning. In the following chapter, I present further empirical motivation for this analysis, and investigate the licensing conditions of prospective aspect.

Chapter 6

Consequences for Prospective Aspect

"It always puzzles me how Venturus manages, living in the future as he does."
"Living in the future?" said Awful. "People can't. It hasn't happened yet."

Excerpt from *Archer's Goon*, by Diana Wynne Jones

6.1 Introduction

Blackfoot *áak-* has been labelled as a future prefix by Frantz (1991, 2009), and as a future modal by Reis Silva (2009b). Taylor (1969) notes that *áak-* (and the progressive variant *áyaak-*) is often equated to the English future by Blackfoot speakers (Taylor (1969):300).¹⁸³ Uhlenbeck (1938)'s description of the *áak-* preverb, however, is far less confident in labelling *áak-* as 'future,' as evidenced by the following excerpt:

A verbal form may be changed into what might be called a future by means of the prefix *ak(s)-*, but by no means every form containing this prefix is to be rendered in that way. In many cases, it is decidedly no sign of the future tense...

(Uhlenbeck 1938: 179)

In this chapter I show that Uhlenbeck (1938)'s hesitation at labelling *áak-* as a 'future' is well-motivated. More specifically, I show that Blackfoot's so-called 'future' modal *áak-* is not in a 1:1 correlation with future temporal reference. For instance, while a future temporal orientation always results when it appears with eventive complements, a present temporal orientation is possible when *áak-* appears with stative complements, lexical or derived. Conversely, a future interpretation can arise in the absence of *áak-*. This is parallel to one context where English allows future interpretations without *will*: the antecedent of a conditional. As is also the case with English *will*, the presence of *áak-* in this context yields an additional volitional flavour (Sweetser (1991), Dancygier & Sweetser (2005)). Under the assumption that *áak-* is a future morpheme, we observe two kinds of futureless futures: one that is morphologically future, but semantically non-future, and one that is semantically future, but morphologically non-future. The basic question I address

183. While Frantz (1991, 2009) and Reis Silva (2009b) consider *áak-* and *áyaak-* to be distinct (although related) forms, Taylor (1969) considers *áak-* to be a surface form of *áyaak-* derived via a phonological process of *y* deletion. His discussion of *áak-* is thus subsumed within his entry on *áyaak-*. Like the previously-mentioned researchers, I consider *áak-* and *áyaak-* to be distinct (although related) forms.

in this chapter is why these apparent form-meaning mismatches occur.

I propose that these kinds of apparent mismatches follow from the analysis of *áak-* presented in chapter 4, wherein Blackfoot's 'future' modal *áak-* is actually an action-dependent circumstantial modal with no particular temporal import. That is, there is no form-meaning mismatch; the correlation of the form *áak-* with the meaning 'future' is a misnomer. 'Future' interpretations are due to a null prospective aspect that is licensed in action-dependent contexts. I further show how this proposal predicts Kaufmann (2005)'s observation about the correlation between volitional readings and the aspectual properties of a modal's complement.

This chapter is organized as follows: in section 6.2 I present the data underlying the generalizations. In section 6.3 I review the non-temporal analysis for the so-called 'future' modal *áak-*, situated in an action-dependent framework for circumstantial modality. In section 6.4 I discuss the licensing conditions of the null prospective aspect, and present an analysis based on Schulz (2008)'s approach for English. In section 6.5 I present Kaufmann (2005)'s observation regarding a correlation between the lack of volitional readings and stative complements. I then show how the analysis proposed here predicts this correlation. I conclude in section 6.6.

6.2 Data Generalisations

In this section I present the core data and generalisations.

6.2.1 Mismatch I: Morphologically 'future' but semantically non-future constructions

The first observation is that Blackfoot's 'future' modal *áak-* does not always yield a prospective interpretation. While a systematically prospective meaning arises with eventive prejacents, the same is not true for stative prejacents. This can be illustrated as follows. First we can observe that when *áak-* takes an eventive prejacents, the interpretation is systematically prospective. A prospective reading is reflected by the translations in (374): this is shown for an accomplishment in (374a), and an activity in (374b).

- | | | | | |
|-------|----|--|----|---|
| (374) | a. | <i>nitáakohpommata</i>
nit- áak -ohpomaat-a
1-FUT-buy.VTA-1:3
'I'll buy it (a dog).' | b. | <i>annahk Amelia áaksstonnatsikahsi'taki</i>
annahk Amelia áak -sstonnat-ikahsi'taki-wa
DEM Amelia FUT-really-laugh.VAI-3
'Amelia will really laugh.' |
|-------|----|--|----|---|

That *áak-* always takes a prospective interpretation with eventive prejacents is suggested by the following data. If the prejacents event is ongoing at the time of reference, the assertion of an *áak-* claim with a bare eventive prejacents is infelicitous, as shown in (375a). In order to use an *áak-* claim

to describe such a situation, the eventive preajcent must first be modified by the imperfective *á-*, as in (375b).

(375) **Context:** We plan to make a feast, and we'll start eating at 1. But it'll be such a feast that at 2pm, we'll still be stuffing our faces.

a. #nitáakitsooyi á'tootoohsi nátoka
 nit-áak-it-ooyi á'-it-o'too-si nátoka
 1-FUT-RL-eat.VAI INCH-RL-arrive.VAI-CJ two

'I will eat at 2 o'clock.'

(This means the eating begins at 2pm)

b. nitáak(saak)áóoyi á'tootoohsi nátoka
 nit-áak-(sa:ki)-á-ooyi á'-it-o'too-hsi nátoka
 1-FUT-(still)-IMPF-eat.VAI INCH-RL-arrive.VAI-CJ two

'I'll (still) be eating at 2 o'clock.'

In contrast, when *áak-* appears with stative or stativized complements, the complement can be interpreted as holding true at a present evaluation time. This is shown below for a lexical stative (376), and for eventives that have been stativized by the imperfective *á-* (377), and the perfect *ikaa-* (378).

(376) **Context:** My mom is babysitting my niece while my sister goes grocery shopping with me. My sister checks her watch and starts rushing us home because my niece is still nursing and it's time for her feeding. She says:

anna Kaia áaksisttso'kini annohk
 anna Kaia áak-isttso'kini-wa annohk
 DEM Kaia FUT-hungry.VAI-3 now

'Kaia will be hungry by now.'

(377) **Context:** There's a secret society, whose initiation process is secret. But rumours suggest that it involves a midnight run along Wreck Beach. Heather is being initiated into the secret society tonight, and I check my watch and see it's midnight. I know she'll never reveal the secret initiation process, so I'll never know for sure, but I figure:

annohk áakitáókska'si omi Wreck Beach
 annohk áak-it-á-okska'si-wa omi Wreck Beach
 NOW FUT-RL-IMPF-run.VAI-3 DEM Wreck Beach

'She'll be running on Wreck Beach right now.'

- (378) **Context:** I told my sister I was going to bake a cake during the afternoon. In the evening, she's coming over and she's thinking excitedly:

áaksikaipisatsskiitaa
 áak-**ikaa**-pisat-ihkiitaa-wa
 FUT-**PERF**-fancy-bake.VAI-3
 'She will have made cake.'

The English translations for (376)-(378) show that the same generalisation holds for English *will*; when English *will* takes a stative preajcent, or a preajcent that is temporally 'stativized' by means of the progressive or perfect, a future interpretation need not result. A prospective interpretation is possible with a stative preajcent, however, as shown by the sequence of examples in (379), where *áak*'s preajcent is stativized by means of the imperfective, and the context is one where the runtime of the preajcent event (the playing in (379a,b) and the learning in (379b,c)) is not ongoing at the time of utterance, but rather taking place after t_0 .

- (379) a. **Context:** My brother got a new computer, supposedly for school work. My mom worries that all he'll do now is play computer games on it.

kitáakái'kitowaawahk
 kit-**áak-á**-ik-it-waawahkaa
 2-FUT-**IMPF**-INTS-RL-play.VAI
 'You'll just be playing on it!'

- b. **Context:** He tries to defend himself, and says:

nitáakitáwaawahk ki nitáakattsitáísskssinima'tsoko
 nit-**áak**-it-**á**-waawahkaa ki nit-**áak**-matt-it-**á**-ssksininima'tsoo
 1-FUT-RL-**IMPF**-play.VAI CONJ 1-FUT-ADD-RL-**IMPF**-get.taught.VAI
 'I'll be playing on it, and I'll also be learning on it!'

- c. **Context:** I take a look at his new computer, and think it looks really nice, and figure I can use it for school too.

nitáakoohkattsitáísskssinima'tsoko
 nit-**áak**-noohk-matt-it-**á**-ssksininima'tsoo
 1-FUT-C.EXP-ADD-RL-**IMPF**-get.taught.VAI
 'I'll learn on it too.'

Observation I

The temporal interpretations of the 'future' Blackfoot *áak*- and English *will* are sensitive to the temporal properties of their complement:

- (i) **Eventive Complement:** Future-shifted interpretation
- (ii) **Stative(ized) Complement:** Future-shifted interpretation optional

6.2.2 Mismatch II: Semantically future but morphologically non-future constructions

The second observation is that there are contexts where a future interpretation arises in the absence of the ‘future’ *áak-*. For instance, the event described by the antecedent of a conditional takes a future interpretation when no *áak-* appears in the antecedent.¹⁸⁴ When *áak-* does appear in this context, an additional volitional/planning flavour is present.¹⁸⁵ Thus the conditional antecedent in (380a), which lacks the ‘future’ marker *áak-*, is nonetheless interpreted as hypothesizing about a possible future event in which a particular individual’s name is picked. The conditional antecedent in (380b), which differs minimally in that the antecedent is marked with the ‘future’ marker *áak-*, on the other hand, means something slightly different. My consultant suggested that (380b) would be used in a context where the name-picking is rigged, and the organizers plan all along to pick a certain individual’s name. (380b) thus appears to hypothesize about a possible current state of affairs in which the organizers plan to pick a certain individual’s name.

(380) **Context:** We’re holding a festival and don’t have enough volunteers to dance. We’re picking names out of a hat to have enough dancers.

- a. *kamsspisotowa’si otsinika’sim áakihpiyi*
 kam-sspisotowa’-si ot-inika’s-im áak-ihpiyi-wa
 if-dance.VAI-SBJ:3 3-name-poss FUT-dance.VAI-3
 ‘If his name is picked, he will dance.’
- b. *kamáaksspisotowa’si otsinika’sim áakihpiyi*
 kam-áak-sspisotowa’-si ot-inika’s-im áak-ihpiyi-wa
 if-FUT-dance.VAI-SBJ:3 3-name-poss FUT-dance.VAI-3
 ‘If they’re going to pick his name, he will dance.’

A similar example is presented in (381). (381a) hypothesizes about a possible future dancing event. The presence of *áak-* in this context yields an additional volitional flavour; the *áak-*-marked antecedent in (381b) would be used in a context where the speaker is emphasizing that they are hypothesizing about the subject being willing to dance (e.g., the subject is a willful child who will only dance if they want).

184. This generalisation holds true for causal/ontic conditional antecedents - i.e., if-clauses that are interpreted as the cause of, or a necessary condition for, the event described by the consequent. Other kinds of conditionals do not have this future-shifted reading.

185. A note on elicitation technique (or the lack thereof): the data correlating to the “volitional flavour” consists of spontaneous consultant comments regarding the difference between a minimal pair (eg., an antecedent with *áak-* versus one without). I have been unsuccessful, however, in devising a successful elicitation test for determining whether or not a morpheme conveys ‘volitional flavour.’ Attempts to obtain a minimal pair from my consultant by providing her with two contexts that differ in terms of volitionality (eg., in terms of whether the speaker is hypothesizing about what would happen if an event occurs, or whether the speaker is hypothesizing about what would happen if an event occurring were consistent with the subject’s plans/commitments/intentions) have not succeeded. Attempts at testing compatibility with volitional predicates like *sstaa-* “want” are problematic because such predicates require embedded conjunct clauses, where the meaning of various morphological elements within conjunct clauses requires much further research. I leave the question of whether a test for volitional flavour can be successfully devised for further research.

- (381) a. *kamihpiyisi áaksikoka'pii*
 kam-ihpiyi-si áak-ik-sok-a'pii-wa
 if-dance.VAI-sbj FUT-INTS-good-bism.VII-3
 'If he dances, it'll be good.'
- b. *kamáakihpiyisi áaksikoka'pii*
 kam-áak-ihpiyi-si áak-ik-sok-a'pii-wa
 if-FUT-dance.VAI-SBJ:3 FUT-INTS-good-bism.VII-3
 'If he *does* dance, it'll be good.'

The same sort of volitional flavour can again be observed with the pair in (382). The context given is one where the target utterance is hypothesizing about Donald's possible desires. Instead of offering the utterance in (382a), which better parallels the morphosyntactic form of the English prompt with the attitude predicate *sstaa*- "want," my consultant offered (382b), where the presence of *áak*- in the antecedent conveys the same sort of volitional flavour.¹⁸⁶

(382) **Context:** Donald is planning to steal the pies we've baked for a fundraising bake sale. Solveiga and Joel won't stand for this, and plan to set a trap for him. They say determinedly: "If Donald wants to steal those pies, we'll catch him!"

- a. *kamsstaaasi omaahksikamo'satoo'si omistsi sitokihkiitaanistsi,*
 kam-sstaa-si om-aahk-ikamo'satoo-hsi om-istsi sitokihkiitaan-istsi
 if-want.VAI-SBJ:3 3-N.FACT-steal.VTI-CJ DEM-0PL pie-0PL
nitáaksissinotowannaan
 nit-áak-yissinoto-a-nnaan
 1-FUT-catch.VTA-1:3-1pl
 'If he wants to steal those pies, we will catch him.'
- b. *annahk Donald kamáaksikamo'sato'si annistsiska pisatsskiitaanistsi*
 ann-wa-hka Donald kam-áak-ikamo'satoo-hsi ann-istsi-hka pisatsskiitaan-istsi
 DEM-3-rel Donald if-FUT-steal.VTI-CJ DEM-0PL-rel? baked.good-0PL
nitáaksissinotowannan
 nit-áak-yissinoto-a-nnaan
 1-FUT-catch.VTA-1:3-1pl
 'If Donald wants to steal those pies, we'll catch him.'

The Blackfoot pattern is not unfamiliar to a native English speaker. As noted by Kaufmann (2005), the presence of *will* in the antecedent of conditionals in English is often associated with volitional/planning-type readings.¹⁸⁷ Dancygier & Sweetser (2005) similarly point out that *will* in a conditional antecedent is acceptable only under a volitional, or more broadly, in Fillmore (1986)'s

186. When I presented the form in (382a) to my consultant in the context, it was also accepted as felicitous.

187. Kaufmann (2005)'s observation is actually that *will* in antecedents isn't always associated with volitional readings. He observes that if *will* takes a stative (or stativized) prejacet, the volitional readings do not arise. I address this observation in section 6.5.

terms, a “positive interest” reading of the antecedent (Dancygier & Sweetser (2005):84).¹⁸⁸

There is an additional context where, in the absence of *áak-*, an event can be interpreted as taking place in the future. The “might” modal *aahkama’p-*, like *áak-*, systematically yields future-shifted interpretations with its eventive prejacents. This is shown for an accomplishment in (383), and for an activity in (384).

(383) *ninaahkama’pkohpommata*
nit-**aahkama’p**-ohpomaat-a
1-might-buy.VTA-1:3
‘I might buy it (that dog).’

(384) *ninaahkama’psstonnatsikahsi’taki*
ni-**aahkama’p**-sstonnat-ikahsi’taki
1-might-really-laugh.VAI
‘I might really laugh.’

Like *áak-*, however, *aahkama’p*-claims with stativized prejacents do not receive systematic future-shifted interpretations. This is shown below for a lexical stative (385), and for eventives stativized by the imperfective (386) and the perfect (387).

(385) **Context:** Saskatoon berries are usually ripe this time of year, but it’s been irregularly cold.
aahkama’pi’tsiiyaa
aahkama’p-i’tsii-yi-aawa
might-be.ripe.VII-3pl-DTP
‘They (saskatoon berries) might be ripe.’

(386) **Context:** After a long shift at the hospital, my sister often falls asleep sitting up while watching t.v. Right now she’s sitting on the sofa, and I think I hear some low, rumbling sounds coming from her.
aahkama’páisohkaanisttsi
aahkama’p-á-sohk-aanistsii-wa
might-impf-loud-do.sthing.VAI-3
‘She might be snoring.’

188. According to Fillmore (1986), willingness is a “a volitional agent’s self-constructed positive interest” (Dancygier & Sweetser 2005:85). The way I understand it, the broader category of ‘positive interest’ also includes senses wherein the agent’s decisions to act are not self-motivated, but motivated by outside parties and circumstances.

- (387) **Context:** After a long shift at the hospital, my sister often falls asleep sitting up while watching t.v. Her eyes are closed, and she might just be resting them, but I doubt it.

aahkama'pikayo'kaanopii
aahkama'p-ikaa-yo'kaa-n-opii-wa
might-PERF-sleep.VAI-?-sit.VAI-3

'She might have already fallen asleep sitting up.'

Observation II

Contexts allowing a future-interpretation (in the absence of *áak-*)

- (i) Conditional antecedents
 - (i) **Without *áak-***: Interpreted as future
 - (ii) **With *áak-***: Interpreted as future + volition
- (ii) Complement of *aahkama'p-*

The same correlation between temporal orientation and the aspectual-temporal properties of a modal's complement has been observed for English *might* by Condoravdi (2002). All of the data generalisations provided so far regarding Blackfoot *áak-*, conditionals and *aahkama'p-*, in fact, can be paralleled with English *will*, conditionals and *might*.¹⁸⁹ The following generalisations, however, show contexts where future-reference is possible in English, but not Blackfoot.

6.2.3 The Lack of Futurates: Morphologically and semantically non-future constructions in Blackfoot

English also allows for another semantically-future but morphologically non-future construction. Copley (2002, 2009) labels the present progressive and simple present constructions in (388a) and (388b) as **FUTURATES**, in contrast to the standard 'future' constructions in (389a) and (389b).

- (388) a. The death-row prisoner **dies** tomorrow at 5pm.
 (SIMPLE FUTURATE)
- b. The new iphone **is being revealed** tomorrow at 12pm.
 (PROGRESSIVE FUTURATE)

189. English also allows the complement of *can* to be interpreted with a future temporal interpretation. I have argued that Blackfoot's ability modal *ohkott-* is not compatible with future temporal interpretations, in chapters 4 and 5, as well as in Louie (2013) and Louie (2014). I will provide further arguments that *ohkott-* is not (alone) able to yield future temporal interpretations in chapter 7.

- (389) a. The death-row prisoner **will** die tomorrow at 5pm.
(SIMPLE FUTURE)
- b. The new iphone **is going to** be revealed tomorrow at 12pm.
(PROGRESSIVE FUTURE)

The observation is that present progressives and simple presents allow future interpretations, although these are only possible in restricted contexts. Copley (2002, 2009) and Schulz (2008) observed that these sorts of constructions are only felicitous in contexts when scheduled plans or commitments regarding the preajacent event are known and salient. Thus the examples in (388) can only be used in contexts where the events described are scheduled to occur at particular times, while the future constructions in (389) have no such restriction. Kaufmann (2005) refers to this contextual restriction on futurates as the **CERTAINTY CONDITION** (CC).

Blackfoot, in contrast, does not have a futurate construction. The Blackfoot imperfective *á-* has the functional load of both the English progressive and simple present; it allows for both in-progress and habitual readings. The Blackfoot imperfective cannot, however, be used in the futurate-licensing contexts. The 'future' *áak-* is always required in these contexts, as shown in (390) and (391), where the preajacent event is planned and scheduled.¹⁹⁰

(390) **Context:** We're planning to take the train to Whistler, and I'm checking the train schedules, because it doesn't leave every day. I see that it leaves tomorrow, and tell you: The train leaves tomorrow.

- a. *áakomatapoo* *apinákosi*
áak-omatap-oo *apinákosi*
FUT-begin.to-go.VAI tomorrow

'It will leave tomorrow.'

- b. # *áóomatapoo* *apinákosi*
á-omatap-oo *apinákosi*
IMPF-begin.to-go.VAI tomorrow

'It is leaving tomorrow/It leaves tomorrow.'

190. The progressive *áyaak-* is also acceptable in this context, as shown below.

(i) **Context:** We're planning to take the train to Whistler, and I'm checking the train schedules, because it doesn't leave every day. I see that it leaves tomorrow, and tell you: The train leaves tomorrow.

- áyaakomatapoo* *apinákosi*
áyaak-omatap-oo *apinákosi*
PFUT-begin.to-go.VAI tomorrow

'It's going to leave tomorrow.'

See Reis Silva (2009b) for more information about the difference between *áak-* and *áyaak-*.

(391) **Context:** My mom is rooting for one particular dancer on a reality dance show, and although she doesn't like to watch the whole show, she always wants to make sure she catches his dances. I see that he's about to start dancing, although he hasn't quite started yet - he's just standing on stage in his initial pose. I yell to my mom:

- a. # *naá* *áihpiyi*
 n-a-á á-ihpiyi-wa
 1-mother.VOC IMPF-dance.VAI-3
 Target: 'Mom, he's dancing!'
BB: Saa, because he's not even dancing.
- b. *naá,* *áakomatapihpiyi*
 n-a-á áak-omatap-ihpiyi-wa
 1-mother.VOC FUT-begin-dance.VAI-3
 'Mom, he's about to start dancing!'

Observation III

Futurate Constructions (morphologically present, semantically future) allowed

- (i) **English:** ✓
 (ii) **Blackfoot:** ×

The data generalisations presented in this section are summarized by Table 6.1. I now move on to the analysis.

Prospective Interpretations allowed in:	English	Blackfoot
Conditional Antecedents	✓	✓
Prejacent of		
<i>áak-/ will</i>	✓	✓
<i>aahkama'p-/might</i>	✓	✓
Imperfective Forms	✓	×
Unmarked Assertions	×	×

Table 6.1: The Distribution of Prospective Interpretations

6.3 Proposal: Action-Dependent *áak-*

The basic observation is that Blackfoot's 'future' morpheme *áak-* is not in a 1:1 correlation with semantic futurity. In particular, there are both (i) morphologically 'future' but semantically non-future constructions and (ii) semantically future but morphologically non-'future' constructions. The basic question I aim to address is as follows: Why do these form-meaning mismatches arise? I propose that these are not actually form-meaning mismatches, and that the so-called 'future' morpheme is an action-dependent circumstantial modal with no particular temporal import. In other words, it is not a 'future' in any sense - it does not denote a time interval following t_0 , or

quantify over a time (or times) following t_0 . The future interpretations associated with *áak*- are due to the presence of a null prospective aspect. In this section I review my basic theoretical assumptions, and then present my action-dependent analysis for *áak*-. I turn to the licensing conditions of the null prospective aspect in section 6.4.

6.3.1 Review: Basic Theoretical Assumptions

Recall that I assume a domain of times, I , in the semantic ontology. Three times are of particular interest for a modal claim. These are (i) the utterance time, t_0 , (ii) the temporal perspective time, t_{mod} (cf. Condoravdi (2002)), and (iii) the event time.

(392) Temporal Components of a modal claim

1. Utterance Time (t_0)
2. Temporal Perspective Time (t_{mod})
3. Event Time ($\tau(e)$)

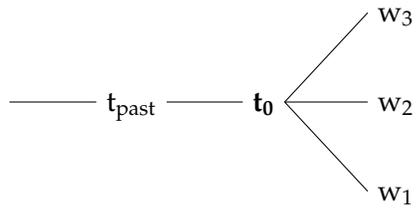
The utterance time corresponds to the time at which the utterance is spoken. The temporal perspective time is a time variable introduced by the modal; it correlates with the time at which the modal claim is based. A modal claim can thus be based on past facts, and have a past temporal perspective time, or be based on present facts, and have a present temporal perspective time. The third time of interest is the event time, which correlates with the runtime of the event described by the modal's complement. Condoravdi (2002)'s notion of **TEMPORAL ORIENTATION** describes the relationship between the temporal perspective time, t_{mod} , and the event time. A modal claim based on facts at some time, t , can thus assert the possibility/necessity of a P-event that precedes the temporal perspective time t . Or it could assert the possibility/necessity of a P-event that follows the temporal perspective time t . Various possibilities for the relationship between the event time and temporal perspective time are listed below in (393).

(393) Possible Temporal Orientations:

$\tau(e) < t$	ANTERIOR/PERFECT
$\tau(e) \circ t$	OVERLAPPING/COINCIDING
$\tau(e) \subseteq t$	CONTAINMENT/PERFECTIVE
$t < \tau(e)$	POSTERIOR/PROSPECTIVE

A final assumption I make about the interaction between modality and time is a non-deterministic view of the world, as schematized by the diagram in (394): I assume an asymmetry between the past and future in that the past is fixed and unchangeable, represented as a single branch, while the future is unsettled and subject to change. It is thus represented as a multitude of different branching possibilities.

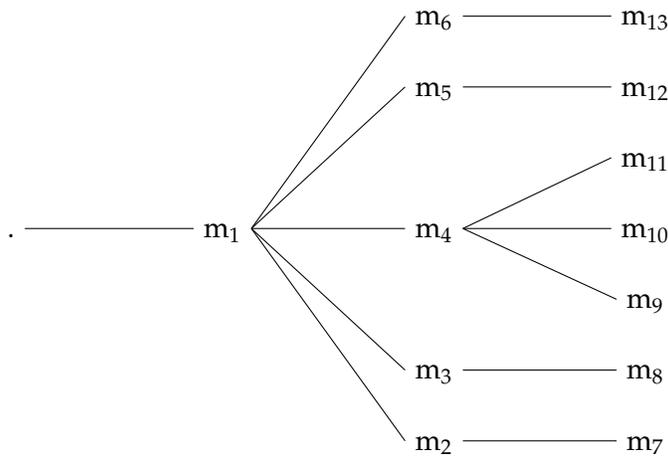
(394) **Branching Futures (cf. Thomason (1970))**



As the branching futures framework will play an important role in characterizing the licensing conditions of prospective aspect, it will be useful to take a more nuanced view of the ontology of times. To that aim, I will revisit some useful concepts introduced in chapter 3 when I discussed the STIT framework of Belnap (1992), Belnap & Perloff (1988) and Horty & Belnap (1995). The concepts of interest are as follows: moments, instants and histories.

Each point in a branching structure like below is a **MOMENT** (e.g., $m_1, m_2, m_3\dots$).

(395) **Branching Time**



Each horizontal path of the tree from beginning to end (left to right) corresponds to a set of moments known as a **HISTORY**, which correlates to the runtime of a world. A single moment may be a member of several histories. For example, the moments $m_1 < m_4 < m_{10}$ form a single history, while the moments $m_1 < m_5 < m_{12}$ form another history; the moment m_1 is thus a member of both histories. Every vertical cross-section of the tree (i.e., the set of moments that are vertically aligned or co-instantial) is an **INSTANT**; note that each instant intersects each history at a single moment. For example, m_2, m_3, m_4, m_5 and m_6 are all co-instantial, and thus contained within the same instant. The semantic ontology thus looks something like (396), an amalgamation of the definitions and ontologies represented in (173) and (198) respectively.

(396) a.	$D_e = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \dots\}$	individuals
b.	$T = \{\mathbf{1}, \mathbf{0}\}$	truth-values
c.	$W = \{\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3, \dots\}$	worlds
d.	$M = \{\mathbf{m}_1, \mathbf{m}_2, \mathbf{m}_3, \dots\}$	moments
e.	$I = \{\mathbf{t}_1, \mathbf{t}_2, \mathbf{t}_3, \dots\}$	times/instants
f.	$H = \{\mathbf{h}_1, \mathbf{h}_2, \mathbf{h}_3, \dots\}$	histories
g.	$Act = \{\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3, \dots\}$	actions

6.3.2 Review: Blackfoot Tense and Aspect

An important part of the analysis regarding the distribution of prospective aspect relies on the assumption that while Blackfoot's past tense denotes a time interval - i.e., a non-trivial set of instants, its present tense denotes an instantaneous time - i.e., a trival/singleton set of instants. For the reader's convenience, in this subsection I review the empirical and theoretical grounds for this claim, originally presented in chapter 2.

Dunham (2008) and Reis Silva & Matthewson (2008) have shown that bare eventives in Blackfoot are always interpreted as past. In order to be interpreted as present, the imperfective *á-* is required. The data is repeated in (397) and (398).

(397) *Anna Mai'stoo ihpiyi*
 ann-wa Mai'stoo-wa **ihpiyi-wa**
 DEM-3 Raven-3 **dance.VAI-3**
 'Mai'stoo danced.' ≠ 'Mai'stoo is dancing.'

(398) *Anna Mai'stoo áihpiyi*
 ann-wa Mai'stoo-wa **á-ihpiyi-wa**
 DEM-3 Raven-3 **IMPF-dance.VAI-3**
 'Mai'stoo is dancing.' OR 'Mai'stoo was dancing.'

Stative predicates, in contrast, are compatible with both past and present interpretations, as shown in (399).

(399) *Anna Mai'stoo isttso'kini*
 ann-wa Mai'stoo-wa **isttso'kini-wa**
 DEM-3 Raven-3 **hungry.VAI-3**
 'Mai'stoo is hungry' OR 'Mai'stoo was hungry.'

Following Bennett & Partee (1978), Reis Silva & Matthewson (2008) propose that the Blackfoot tense patterns can be accounted for with two assumptions. First, that eventives are inherently dynamic - i.e., they involve some change over time and therefore have non-trivial (non-instantaneous) temporal extents. And second, that Blackfoot's present tense is instantaneous. Because eventives are crucially non-instantaneous, but Blackfoot's present tense is instantaneous, the two are incompatible. This is why eventive predicates are only compatible with past interpretations. They cannot be interpreted with respect to Blackfoot's instantaneous present tense unless they are first stativized by means of the imperfective (398) or perfect *akaa-* (400).

- (400) *anna Michael akooowatoomayi*
 anna Michael-wa *akaa-oowatoo-m-ayi*
 DEM Michael-3prox PERF-eat.VTI-3:inan-DTP
 'Michael has/had already eaten it (the sandwich).'

This incompatibility of eventive predicates with a present evaluation time is an observation that will play an important role in the analysis presented in this chapter, just as it did with the analysis presented in chapter 4.

Formally I have assumed that Blackfoot's (null) past tense correlates with a variable that ranges over intervals (i.e., sets of ordered, contiguous instants), while Blackfoot's (null) present tense correlates with a variable that ranges over trivial intervals (i.e., crucially singleton sets of instants). By default, this variable is interpreted by the context, *c*, as the utterance time t_0 . I further assumed that past and present (t_{iPAST} and t_0) are the only tenses that Blackfoot makes available - i.e., there is no such thing as a future tense t_{iFUT} .

- (401) a. $\llbracket \emptyset_{PRESENT} \rrbracket^{h,c} = t_i = c(i)$,
 (Where $c(i)$, unless otherwise specified, is t_0) type *i*, an instant (trivial interval)
- b. $\llbracket \emptyset_{PAST} \rrbracket^{h,c} = t_{iPAST} = c(i)$, provided $c(i) < t_0$ type *i*, an interval

I now review the action-dependent analysis for *áak-* that can account for the two apparent form-meaning mismatches, *áak-*'s otherwise systematic future-interpretations, and *áak-*'s tendency to convey volitional flavour.

6.3.3 Review: Action-Dependent Circumstantial *áak-*

Recall the basic question - if *áak-* is a future morpheme, why are there cases where (i) *áak-* does not force a future interpretation and (ii) *áak-* is not necessary for a future interpretation? In chapter 4 I proposed that *áak-* is not a future morpheme at all, but rather an action-dependent circumstantial modal with a vacuous temporal content. The analysis was inspired by Brown (1988)'s logic for ability and branching-time temporal systems like CTL and ATL (Emerson & Clarke (1982), Alur

et al. (2002)). In this section I review the analysis, and then turn to a discussion of how particular parts of the analysis can account for the data generalisations observed in section 6.2.

Brown (1988) proposes that circumstantial modals like “can” and “will” incorporate quantification over **ACTIONS** as well as worlds, where we can think of actions as moves that an agent makes, to transition from an initial state (s_0), to a secondary state (s_1). Following the approaches of CTL/ATL, I posited a domain of actions in the semantic ontology, so that actions are primitives, as in (402).

(402)	a.	$D_e = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \dots\}$	individuals
	b.	$T = \{\mathbf{1}, \mathbf{0}\}$	truth-values
	c.	$W = \{\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3, \dots\}$	worlds
	d.	$M = \{\mathbf{m}_1, \mathbf{m}_2, \mathbf{m}_3, \dots\}$	moments
	e.	$I = \{\mathbf{t}_1, \mathbf{t}_2, \mathbf{t}_3, \dots\}$	times/instants
	f.	$H = \{\mathbf{h}_1, \mathbf{h}_2, \mathbf{h}_3, \dots\}$	histories
	g.	$\mathbf{Act} = \{\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3, \dots\}$	actions

I followed Chierchia (1998) in formalizing actions as kinds; just as individuals are instantiations of kinds, events are instantiations of what Chierchia (1998) calls “action-types.” What I refer to as an action correlates with his notion of action-type. Given this sort of formalization, I posited the existence of an action-instantiation relation, R , which holds true of an action, individual, world and time if the agent, x , participates in the instantiation of the action \mathbf{a} in \mathbf{w} at time \mathbf{t} , where \mathbf{t} correlates with the runtime of the event that the instantiates the action \mathbf{a} .

(403) The Instantiation Relation, R

$R(\mathbf{a}, x, \mathbf{w}, \mathbf{t}) \approx$ The agent x participates in the instantiation of the action \mathbf{a} in \mathbf{w} at \mathbf{t}
(where \mathbf{t} is the runtime of the event instantiating \mathbf{a})

This system, with two levels of quantification (one over actions and one over worlds) allows us to have four, as opposed to two, grades of strength for modals. This has allowed us to distinguish the strength of “will” and *áak*- which universally quantify over both worlds and actions, while ability modals like Blackfoot *ohkott*- existentially quantify over actions but universally quantify over worlds. Under this system, I offered a denotation for *áak*- as below in (404).

(404) $\llbracket \acute{a}ak \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$
 $\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}] \rightarrow P(x, w', t)]$

“All actions, \mathbf{a} , available to x in w at \mathbf{t} , are such that all of the (highest ranked) worlds

- (i) with instantiations of those actions by x at t ,
- (ii) compatible with x 's circumstances in w at t ,
are P-worlds"

(In other words, no matter which action the agent chooses, P obtains.)

The denotation can be broken down as follows: The modal $\hat{a}ak$ - universally quantifies over the actions available to an individual, x , in w at time t . This is represented by \mathcal{A} , a function that applies to an individual, x in w at t , and yields the set of actions available to x in w at t (the "action modal base"). The actions yielded are just those highest ranked by a bouletic/intentional ordering source $\mathcal{B}(x,w,t)$. The modal then universally quantifies over worlds with instantiations of those actions - i.e, the worlds, w' , such that $R(a,x,w',t)$ holds true. This set of worlds is then further restricted, by a circumstantial modal base, C and stereotypical ordering source, G : the modal only considers the worlds highest ranked by G which are compatible with x 's circumstances in w at t . All of the remaining worlds are asserted to be worlds where P holds (of x at time t).

6.3.4 Accounting for Observation I: Future Interpretations

Crucially, the denotation for $\hat{a}ak$ - has no temporal contribution; the λt variable that $\hat{a}ak$ - takes provides the temporal argument for all of the functions and relations in the denotation including (i) the action and circumstantial modal bases \mathcal{A}, C , and (ii) the temporally-indeterminate prejacent property P . The temporal orientation encoded by $\hat{a}ak$ - is thus one of coincidence - the time on which the modal claim is based, and the time at which the complement event is asserted to take place are the same time. The observation that $\hat{a}ak$ -s stative complements can take present/coinciding temporal interpretations is thus exactly what we expect, given the proposed analysis (i.e., the data in (376)-(378)). The first 'futureless future' mismatch is thus actually the default case.

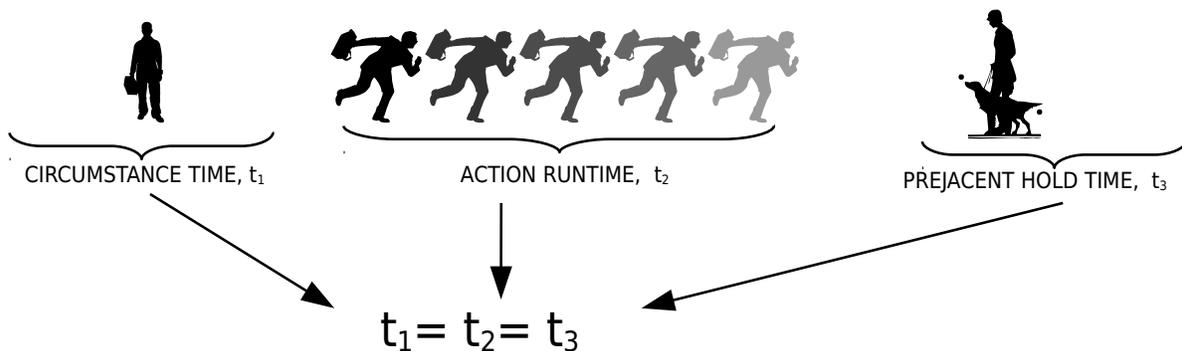


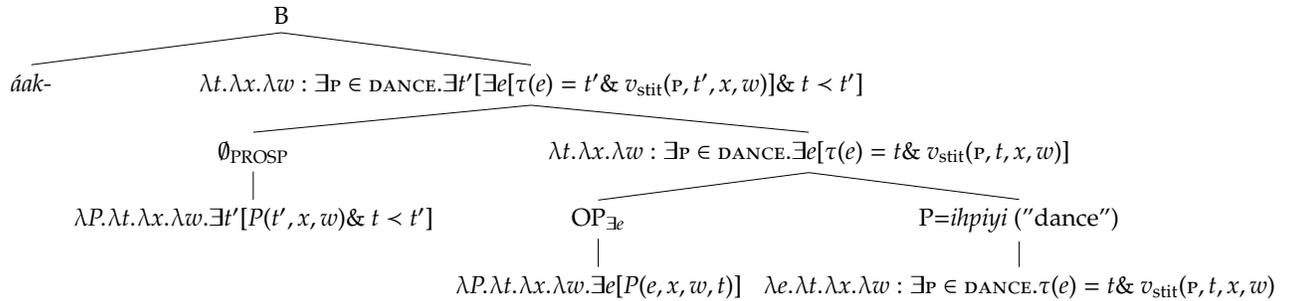
Figure 6.1: Correlation of Times for a Blackfoot Circumstantial Claim

But what about the systematic future interpretations associated with *áak-*'s eventive complements? The first thing to note is that *áak-*, by default, takes a present evaluation time.¹⁹¹ I assume, following Condoravdi (2002), that a modal's present evaluation time is provided via tense - i.e., that Blackfoot's instantaneous present tense provides the present evaluation time for any modal. Given Reis Silva & Matthewson (2008)'s observations about the incompatibility of eventives with Blackfoot's instantaneous present, we do not expect the same sort of present/coinciding temporal interpretation seen with statives. I propose that in order to resolve this incompatibility, the temporally-indeterminate prejacet property, *P*, is interpreted as having been modified by a null prospective aspect, as in (405).

$$(405) \quad \llbracket \emptyset_{\text{PROSP}} \rrbracket^{\text{h.c}} = \lambda P. \lambda t. \lambda x. \lambda w. \exists t' [P(t') \& t < t']$$

Thus stative (and temporally stativized) predicates can be interpreted with respect to the default present evaluation time, and take a coinciding temporal orientation. Eventive predicates, on the other hand, which are configurationally incompatible with a present evaluation time (cf. Bennett & Partee (1978), Reis Silva & Matthewson (2008)), must be first modified with a null prospective aspect before they combine with *áak-*. This is why eventive predicates are systematically interpreted with prospective/future temporal orientations.

(406) Eventive Complements for *áak-*



$$\begin{aligned} B &= \lambda P. \lambda t. \lambda x. \lambda w. [\forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\ &\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}] \rightarrow P(t, x, w')]] \\ &(\lambda t. \lambda x. \lambda w : \exists P \in \text{DANCE}. \exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, t', x, w)] \& t < t']) \end{aligned}$$

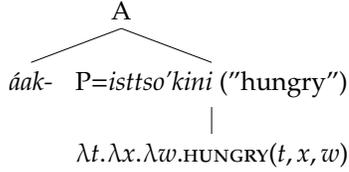
$$\begin{aligned} &= \lambda t. \lambda x. \lambda w : \exists P \in \text{DANCE}. [\forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\ &\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}] \rightarrow \exists t' [\exists e [\tau(e) = t' \& v_{\text{stit}}(P, t', x, w')]] \& t < t']] \end{aligned}$$

All of the actions, *a*, available to the agent, *x*, in *w* at *t*, are such that,
all of the worlds, *w'*, with instantiations of those actions (by *x* at *t*) that are also compatible

191. While it can take a past evaluation time, this requires the past evaluation time to have been made salient in the context, or to have been made linguistically salient by means of a past temporal adverbial or 'when'-clause.

with x 's circumstances in w at t , are worlds where there is a time, t' , such that t' follows t , and there is an event, e , where t' is the runtime of e , and t' is an interval where x sees to it that x dances.

(407) Stative Complements for *áak-*



$$\begin{aligned}
 \text{A} &= \lambda P. \lambda t. \lambda x. \lambda w. [\forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\
 &\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}] \rightarrow P(t, x, w')]] (\lambda t. \lambda x. \lambda w. \text{HUNGRY}(t, x, w))
 \end{aligned}$$

$$\begin{aligned}
 &= \lambda t. \lambda x. \lambda w. [\forall a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\
 &\forall w' [[R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}] \rightarrow \text{HUNGRY}(t, x, w')]]
 \end{aligned}$$

All of the actions, a , available to the agent, x , in w at t , are such that, all of the worlds, w' , with instantiations of those actions (by x at t) that are also compatible with x 's circumstances in w at t , are worlds where x is hungry at t .

Observation I: Accounted for under the analysis

The temporal interpretation of the 'future' Blackfoot *áak-* and English *will* is sensitive to the temporal properties of its complement:

- | | |
|--|---|
| (i) Eventive Complement: Future-shifted interpretation | ✓ |
| (ii) Stative(ized) Complement: Future-shifted interpretation optional | ✓ |

Given the similar pattern for temporal orientation associated with the modal *aahkama'p-*, a denotation for *aahkama'p-* that is essentially identical to *áak-*'s denotation with the exception that it existentially, as opposed to universally, quantifies over actions and worlds, is fitting. The denotation, repeated from chapter 4, is provided in (408). As is the case with *áak-*, *aahkama'p-* has no inherent temporal import, and with stative (or stativized) complements can yield a coinciding/overlapping temporal orientation. With eventive predicates, the lack of temporal import results in incompatibility with the present temporal perspective. Eventive complements thus are always interpreted as having first been modified by a null prospective aspect.

$$\begin{aligned}
 (408) \quad \llbracket \text{aahkama'p-} \rrbracket^{\text{h.c}} &= \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\
 &\exists w' [R(a, x, w', t) \& w' \in C(x, w, t)_{\leq G(w, t)} \& P(x, w', t)]
 \end{aligned}$$

6.3.5 Accounting for *áak*-’s Volitional Component

The second observation we aim to account for involves the identification of contexts in Blackfoot which allow for future interpretations in the absence of *áak*-. The observation is repeated below: in the absence of *áak*-, future interpretations are allowed in (i) the antecedent of conditionals, and (ii) the complement of *aahkama’p*-. The observation that conditional antecedents allow for future interpretations without *áak*- went hand-in-hand with the observation that when *áak*- does occur in this context, it yields an additional volitional flavour - i.e., in this context, the presence of *áak*- appears to yield a claim about the agent’s plans or volitions, as opposed to a claim about the agent’s circumstances (cf. (381b), (380b), (382a)). In this section I discuss how the action-dependent framework can account for these volitional readings.

Observation II

Contexts allowing a future-interpretation (in the absence of *áak*-)

- (i) Conditional antecedents
 - (i) **Without *áak*-:** Interpreted as future
 - (ii) **With *áak*-:** Interpreted as future + volition
- (ii) Complement of *aahkama’p*-

Note that the same volitional flavour is expressed by English “will” in conditional antecedents like (409), as well as its so-called “dispositional” uses like (410). The “will”- marked antecedent in (409a) seems to convey the meaning of the paraphrase “If she’s willing to rob the bank...” while the unmarked antecedent in (409b) lacks this extra volitional reading. The use of “will” in (410) is often labelled “dispositional” because it conveys Mary’s willingness to eat beans.

- | | | |
|-------|--|----------------|
| (409) | a. If she’ll rob the bank, I’ll drive the getaway car. | VOLITIONAL |
| | b. If she robs the bank, I’ll drive the getaway car. | CIRCUMSTANTIAL |

- | | | |
|-------|---------------------------------|------------------------------|
| (410) | Mary’ll eat beans (these days). | Based on Copley (2002, 2009) |
|-------|---------------------------------|------------------------------|

Copley (2002, 2009) suggests that willingness/volition is hardwired into the meaning of futures, proposing that futures have bouletic ordering sources. The actual implementation that Copley (2002, 2009) employs, however, is not an ordering source but a definedness condition. Futures are defined “iff *d* directs *q* in *w* at *t*” where *d* refers to the “director,” or agent, and *q* is the prejacent. Crucially, her notion of “direction” is defined in terms of the director/agent’s commitments, which gives futures their willingness/volitional flavour. In the system that I have set up here, volition is truly implemented as an ordering source, however this is an ordering source on the action modal

base $\mathcal{A}(x,w,t)$, as opposed to an ordering source on the circumstantial modal base. The actions yielded by $\mathcal{A}(x,w,t)$ are ordered by the agent's volitions in w at t , $\mathcal{B}(x,w,t)$, and only the actions best suited to realizing these volitions are used to restrict the modal's domain of quantification. Because *áak*- universally quantifies over these actions, an *áak*- claim can be used as an indication of the agent's volitions: the prejacent must be compatible with all of the possible actions that the agent is considering. Barring circumstances that are out of the agent's control, the prejacent must be something that the agent is committed to - either because they are aiming for it, or are resigned to it. Thus an *áak*- /"will" P claim can be true because P is guaranteed by either

- (i) The agent ruling out actions that won't result in P, or
- (ii) The circumstances ruling out the initial situations where the actions could successfully result in the prevention of P.

These two ways of guaranteeing the truth of an *áak*-/"will" P claim correlate with the restrictions provided by the bouletically-ordered action modal base and the stereotypically-ordered circumstantial modal base respectively.

Contrast this with an ability modal like *ohkott*-, which only existentially quantifies over the volitionally-ordered action set. Because it only existentially quantifies over these actions, an *ohkott*- claim is not a reliable indication of the agent's volitions: the prejacent only need be compatible with some of the actions the agent is considering. The prejacent may be incompatible with other actions that the agent is still considering. Thus the prejacent may be something that the agent is not committed to. This is why *áak*- claims are associated with a flavour of volition/commitment, while *ohkott*- claims are not.

Note that the analysis presented here differs from Copley (2002, 2009)'s in that it makes a prediction about correlations between volitional readings and temporal orientation - more specifically, I predict that volitional readings are lost when modals like *will* and *áak*- are interpreted with coinciding temporal orientations. I discuss this prediction in more detail in section 6.5.

At this point, the analysis can only account for why volitional readings are often associated with *áak*- (in contrast to purely circumstantial readings). It does not explain why volitional readings seem to systematically arise when *áak*- occurs in the antecedent of conditionals, while it only occasionally arises with uses of *áak*- outside of conditional antecedents. I suggest that the reason why volitional readings are associated with *áak*- in the antecedent of conditionals is related to whether or not *áak*- is required to license prospective aspect, the issue I address in the following section. The basic intuition is as follows: while *áak*- is a bouletically-ordered circumstantial modal, it also acts to license prospective aspect. In contexts where prospective aspect is independently licensed, *áak*-'s non-temporal properties are highlighted.

6.4 Proposal: Licensing Prospective Aspect

6.4.1 Determining the Licensing Contexts

The analysis of *áak-* presented is one where *áak-* is inherently non-temporal. The future readings that arise in its presence are actually due to the presence of a null prospective aspect. An obvious question arises once the existence of a null prospective aspect is proposed. If there is a null prospective aspect, why isn't it freely available to any predicate in Blackfoot, so that any predicate in Blackfoot can be interpreted as future-shifted? Why is *áak-* or *aahkama'p-* required for a future interpretation for bare predicates in Blackfoot? Note too that it's not just non-modal predicates that are restricted from having a future interpretation. The complement of the epistemic modal *aahk-* similarly is barred from having a future interpretation: while stative(ized) complements can be interpreted so that the prejacent event is ongoing at the time of utterance (411), eventive complements can only be interpreted as having preceded the time of utterance (412).

(411) Epistemic *aahk-* with Stative(ized) Complements

a. Stative Complement ($\tau(e) \circ t_0$)

Context: Hermione is worried about Snape, who seems to have gone to play double agent. Ron, who doesn't like Snape much, worries more about Professor Lupin, who only ate a small steak, which isn't very much for a werewolf. He muses:

kamsáóowatsiisi *annisk* *Snape*, *aahksisttso'kini*
kam-sa-oowat-yii-si *annisk* *Snape*, *aahk-isttso'kini*
if-NEG-eat.VTA-3:3'-SBJ:3 DEM *Snape*, **EPIST-hungry.VAI**

'If he didn't eat Snape, he must be hungry.'

b. Imperfective/Progressive Complement ($\tau(e) \circ t_0$)

Context: My sister and brother-in-law, the parents to my niece, are coming over for dinner, but my brother in law, the father of my niece, gets to our house after my sister and niece. He looks at the time, and sees that it's about time for the baby to be hungry. He notices that the house is quiet, and figures:

kámsawaasai'nisi, *aahkáisstaa*
kam-sa-waasai'ni-si, **aahk-á-sstaa-wa**
if-NEG-cry.VAI-SBJ:3, **EPIST-IMPF-NURSE.VAI-3**

'If she's not crying, she must be nursing.'

(412) Epistemic *aahk-* with Eventive Complement ($\tau(e) < t_0$)

Context: Piitaaki has broken into our compound, stolen something, then managed a successful escape. We tap her friend's phone, and when Piitaakii contacts her, we hear a horse whinnying. There are only stables to the west or east, so we conclude that she stole a horse from a stable and:

kamítkamo'tsisi *ponokaomitaa,* *aahkohto'too* *nimmohtsi* *tsaahto*
 kam-ikamosat-yii-**si** ponokaomitaa, **aahk**-ooht-o'too-wa nimm-ohtsi tsaahto
 if-steal.VTA-3:3'-**SBJ**:3 horse, **EPIST**-source-arrive.VAI-3 west-direction or
isskihtao'ohtsi
 isskihtao'-ohtsi
 east-direction

'If she stole a horse, she must have gone west or east.'

The data in (413) shows that *aahk-* claims with bare eventive complements are not allowed in future contexts. In contexts where the complement of *aahk-* describes a future event, *aahk-*'s complement must be marked with the progressive future *áyaak-*, as in (413a). The bare form, shown in (413b), is unacceptable in the context. (413b) requires a context where the hypothesized cake-baking event occurred in the past.

(413) **Context:** It's my mom's birthday, and my dad has a surprise planned for her. But she hates surprises, so she tries to weasel the truth out of her kids by asking questions. She's already figured out he went to the grocery store to buy something, so she thinks he's going to cook her something special. She says the following, and watches our faces to see if we react.

- a. (*matónni*) *kamóhpommaasi* *owáistsi,* *aahkayaasihkiitaa* *pisátsskiitaan*
 (matonni) kam-ohpommaa-si owaa-istsi, **aahk-áyaak**-ihkiitaa-wa pisát-ihkiitaan
 yesterday if-buy.VAI-3:SBJ egg-0PL, **EPIST**-PFUT-bake.VAI-3 fancy-baking

'If he had bought eggs (yesterday), maybe he was gonna make a cake.'

- b. #(*matónni*) *kamóhpommaasi* *owáistsi,* *aahkihkiitaa* *pisátsskiitaan*
 (matonni) kam-ohpommaa-si owaa-istsi, **aahk**-ihkiitaa-wa pisát-ihkiitaan
 yesterday if-buy.VAI-3:SBJ egg-0PL, **EPIST**-bake.VAI-3 fancy-baking

Target: 'If he had bought eggs (yesterday), maybe he was gonna make a cake.'

Translation: 'If he bought eggs, he must have made cake.'

We can make a similar observation with stative or stativized complements. The context in (414) is one that favours a future interpretation for *aahk-*'s prejacent. However, the form where the prejacent is stativized by means of the imperfective in (414a) is infelicitous in this context. This is despite the fact that the English prompt "He must **be dancing** tomorrow" has a progressive-marked prejacent. As was the case for the previous example, the prejacent must be marked by the progressive future *áyaak-* in order to describe a (possible) future event.¹⁹²

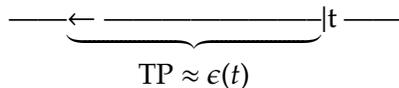
192. The non-progressive form *áak-* cannot be embedded under *aahk-*, as shown by the minimal pair below. This reflects a general property of *áak-*; *áak-* cannot be embedded under other modals.

(414) **Context:** We're going to a dance festival, which lasts for three days, and we know this guy is going to be there, and he's going to dance on one of the three days. We heard that he was going to dance on the second day, so that's when we arrive. But throughout the entire day, we don't see him dance. My mom, ever hopeful, says: he must be dancing tomorrow.

- a. #annahk Alex *aahkáihpiyi* *apinákosi*
 ann-wa-hka Alex **aahk-á**-ihpiyi-wa apinakosi
 DEM-3-invs Alex **EPIST-IMPF**-dance.VAI-3 tomorrow
 'Alex must be gonna dance tomorrow.'
- b. *annahk* Alex *aahkáyaakihpiyi* *apinákosi*
 ann-wa-hka Alex **aahk-ayaak**-ihpiyi-wa apinakosi
 DEM-3-invs Alex **EPIST-PFUT**-dance.VAI-3 tomorrow
 'Alex must be gonna dance tomorrow.'

In chapter 4 I proposed that epistemic modals in Blackfoot like *aahk-* are associated with a past-extended temporal perspective time. That is, when *aahk-*'s λt variable is satisfied by t_0 , the modal claim is based on the evidence gathered not just at t_0 , but during a past-unbounded interval $\epsilon(t_0)$, as illustrated below.

(415) Proposed Temporal Perspective time for Epistemic Modals:



Where ϵ is the function that takes a time, t ,
 and yields the past-unbounded interval right-demarkated by t .

Under this assumption, the examples above can be analyzed so that the eventualities described by the stative (or stativized) prejacent overlap with $\epsilon(t_0)$ (a present/coinciding temporal orientation), and the eventualities described by the bare eventive examples are contained within $\epsilon(t_0)$

(i) **Context:** I see a printout of a confirmation for a flight to San Francisco tomorrow in the linguistics reading room. I know that Natalie works in the reading room, and that her partner lives in California. I figure:

- a. *annahk* Natalie *kamohpommatóosi* *anihk* *ihtaisapopo'pii*, *aahkayáakitapoo* *omi* San
 annahk Natalie kam-ohpommatoo-si annihk ihtaisapopo'pii, **aahk-ayáak**-itap-oo-wa omi San
 DEM Natalie if-buy.VTI-SBJ:3 DEM ticket, **EPIST-PFUT**-towards-go.VAI-3 DEM DEMSan
 Francisco *apinákosi*
 Francisco apinakosi
 Francisco tomorrow

'If Natalie bought this ticket, she must be going to San Francisco tomorrow.'

- b. #annahk Natalie *kamohpommatóosi* *anihk* *ihtaisapopo'pii*, *aahkáakitapoo* *omi* San
 annahk Natalie kam-ohpommatoo-si annihk ihtaisapopo'pii, **aahk-áak**-itap-oo-wa omi San
 DEM Natalie if-buy.VTI-SBJ:3 DEM ticket, **EPIST-FUT**-towards-go.VAI-3 DEM San
 Francisco *apinákosi*
 Francisco apinakosi
 Francisco tomorrow

Target: 'If Natalie bought this ticket, she must be going to San Francisco tomorrow.'

(a containment temporal orientation). In any case, *aahk-* does not allow for readings where the eventuality described by its prejacent follows t_0 or $\epsilon(t_0)$.

We also previously observed that Blackfoot's imperfective, *á-*, is not sufficient to license prospective temporal interpretations (recall (390) and (391)). Thus the imperfective's complement cannot be interpreted as being modified by a null prospective aspect. From this we can conclude that if Blackfoot has a null prospective aspect, it must have strict licensing conditions. While it is licensed in the complement of the modals *áak-* and *aahkama'p-*, and in the antecedent of conditionals, it is not licensed in bare assertions, nor is it licensed in the complement of the epistemic modal *aahk-*, or the (modal) imperfective *á-*. This is summarized in Tables 6.2 and 6.3. This is the question to which I turn next: how can the licensing conditions for Blackfoot's null prospective aspect be formalized?

Prospective Aspect Licensed in:	English	Blackfoot
Prejacent of <i>áak-</i> /will, <i>aahkama'p-</i> /might	✓	✓
Conditional Antecedents	✓	✓
Imperfective "Futurates"	✓	×
Unmarked Assertions	×	×

Table 6.2: Licensing Contexts for Prospective Aspect (General)

Blackfoot Modal	Prospective Interpretation allowed?
<i>áak-</i> "will"	✓
<i>aahkama'p-</i> "might"	✓
Imperfective (GEN and PROG)	×
<i>aahk-</i> "must"	×

Table 6.3: Licensing Conditions for Prospective Aspect (Modal Complements)

6.4.2 Formalizing the Licensing Contexts

The conditions in which prospective interpretations are licensed can be categorized into two kinds of contexts: (i) in the complement of certain modals and (ii) in the antecedent of conditionals. I will argue that the means of licensing prospective aspect is distinct in these two contexts: while it is the availability of a bouletically-ordered action modal base that licenses prospective aspect in the complement of action-dependent circumstantial modals like *áak-* and *aahkama'p-*, it is the role of an if-clause as a modal restriction that licenses prospective aspect in conditional antecedents, in the spirit of Schulz (2008). In this section I discuss the licensing of prospective aspect in the complement of modals. I leave the discussion of conditional antecedents for section 6.4.3.

The first question I address is why an unmarked Blackfoot assertion cannot be interpreted as future. I propose that this follows from a Schulz (2008)-inspired approach wherein reference to the future results in undefinedness. This approach is conceptually motivated by the non-deterministic approach that I adopted in chapter 4; the branching-futures framework that I use is one where the past is necessary and fixed, but the future is not fixed, being dependent on the particular actions that individuals may or may not take. This contrasts with a deterministic model of the world, where the future is fixed, but the way in which it is fixed (i.e., the ‘facts’ of the future) are epistemically inaccessible to a speaker (cf. Kamp (1978)). The action-dependent approach to circumstantial modality I take is wholly incompatible with such a deterministic model. It is, however, compatible with the intermediate approach that Schulz (2008) proposes for English, and the system that Schulz (2008) attributes to Aristotle. Schulz (2008) describes the system presented in Aristotle’s *De Interpretatione* as a fully non-deterministic system: no parts of the future are defined. Schulz (2008)’s approach presents an intermediate position between Aristotle’s non-deterministic approach and Kamp (1978)’s deterministic approach: Schulz (2008) proposes that for the most part, the future of the actual world is undefined. Parts of the future, however, can be defined if they are entailed by (i) present facts and (ii) basic undefeasible general laws. The present facts of interest are things like scheduled plans, intentions and desires. This, she suggests, is why simple present sentences, if interpreted as future, are only felicitous if the events being described are pre-planned. Without present facts like present plans/intentions, the truth-value of the future proposition is undecided and the world, w_0 , undefined for that portion for the future.

(416) Modelling the Future (t_0 = utterance time)

- | | | |
|----|----------------------|-------------------|
| a. | ————— t_0 —————→ | Deterministic |
| b. | —————→ t_0 | Non-deterministic |
| c. | ————— t_0 — — — —→ | Intermediate |

While Schulz (2008) assumes a framework where worlds are valuation functions from propositions to truth-values, in the framework I have adopted, worlds are formalized as entities/particulars, and propositions are formalized as functions from worlds to truth-values. Unlike Schulz (2008), then, I cannot put a definedness condition on w_0 . I will, rather, put the definedness condition on a valuation function, \mathcal{V} . When $\llbracket \cdot \rrbracket^{hc}$ applies to propositions, it yields the output of \mathcal{V} , where \mathcal{V} is the function that maps propositions from world and time arguments to truth-values. In order to encode the intuition that the future is undefined in Blackfoot, I propose that \mathcal{V} is only defined for propositions where the moments that are associated with the evaluation world’s history and the moments that make up the evaluation time, t , overlap in terms of the moments they contain. Assume that the Hebrew symbol *he*, η , represents the function that maps a world onto the set of ordered moments making up that world’s history. This history-assigning function, η , is defined in such a way that it does not assign to w_0 any moments beyond the instant t_0 . This is represented below in (i). The definedness condition on \mathcal{V} requires that the set of moments making up the eval-

uation times, $t \in I$, and the set of moments that make up w 's history, $\pi(w) \in H$, are not disjoint. This is represented below in (ii). The denotation for prospective aspect in (iii) requires \mathcal{V} to interpret the temporally-indeterminate property P with respect to the temporal variable t' and the evaluation world, w .

(417) Encoding "Future Undefinedness" of w_0

(i) The history-assigning function, π , fails to assign w_0 future temporal moments

$$\forall t' \forall m' [t_0 < t' \& m' \in t'] \rightarrow m' \notin \pi(w_0)$$

(ii) \mathcal{V} Definedness Condition

$$\mathcal{V}(p)(w)(t) \text{ is defined iff } t \cap \pi(w) \neq \emptyset$$

(iii) $\llbracket \emptyset_{\text{PROSP}} \rrbracket^{\text{h,c}} = \lambda P. \lambda t. \lambda x. \lambda w : \exists t' [P(t', x, w) \& t < t']$

If the evaluation world is w_0 , where $\pi(w_0)$ lacks overlapping moments with the future time t' , then any proposition that has been modified by prospective aspect will result in a proposition that the valuation function, \mathcal{V} (and hence $\llbracket \cdot \rrbracket^{\text{h,c}}$), is undefined for. In this way, the actual world, w_0 , can be formalized as "undefined" for the future within the sort of framework adopted here. A bare assertion, evaluated with respect to w_0 , thus cannot be modified with the null prospective aspect, as the result will be undefined. This is why a bare assertion cannot be interpreted as describing a future event.

In order to make reference to a future time, propositions from which future facts can be reasonably inferred must be available. That is, the grammar must provide the means to access the agent's plans/intentions and (ii) undefeasible general laws. *áak*'s action modal base, of course, provides exactly this; the actions available to the agent, $\mathcal{A}(x, w, t)$, are partially determined by the action's plans and intentions, $\mathcal{B}(x, w, t)$, and the stereotypical ordering source, $G(x, w, t)$, provides the undefeasible general laws. The modal *aahkama*'*p*-, which similarly relies on a bouletically-ordered action modal base and a stereotypically-ordered circumstantial modal restriction, also provides exactly the right sort of propositions to license prospective aspect. I have argued previously, however, that Blackfoot's epistemic modal *aahk*- and imperfective *á*- do not make reference to an action modal base, and correlatingly, they do not license prospective aspect in their complement (Louie (2014)).¹⁹³

Notice that the system I have proposed is more in line with Aristotle's fully non-deterministic system than Schulz (2008)'s intermediate system. Schulz (2008)'s system is geared to account for the distribution of prospective interpretations in English, where contextually-salient facts that

193. Earlier in the thesis (chapter 4), and in Louie (2014) I argue that epistemic modals like *aahk*- quantify over hypotheses and doxastically accessible worlds, and that the imperfective *á*- quantifies over actions where the agent takes the null action. Neither access the bouletically-ordered action modal base. I also argue that Blackfoot's ability modal *ohkott*-, while dependent on an action modal base $\mathcal{A}(x, w, t)$, is incompatible with prospective aspect for independent reasons (this discussion is presented in chapter 4).

Blackfoot Modal	Prospective Interpretation allowed?
<i>áak-</i> , <i>áyaak-</i> "will" "be going to"	✓
<i>aahkama'p-</i> "might"	✓
Imperfective (GEN and PROG)	×
<i>aahk-</i> "must"	×

Table 6.4: Licensing Conditions for Prospective Aspect (Modal Complements)

ensure future events allow for future-interpretations in the absence of *will* (i.e., futurates). However, as Blackfoot does not license future-interpretations in the absence of *áak-*, even if there are contextually-salient facts that ensure future events, a formalization of Aristotle's system is better suited to account for the distribution of prospective interpretations in Blackfoot. Later in this chapter I propose that the difference between English and Blackfoot is not one in terms of the moments that $\bar{\eta}$ assigns to w_0 . Rather, I suggest that the difference should be formalized in terms of what the language requires in order to make inferences about the future of w_0 : Blackfoot, I suggest, requires the agent's plans and volitions (i.e., the content of $\mathcal{B}(x,w,t)$) to be made linguistically salient by means of an overt modal like *áak-*. English, also requires that the agent's plans and volitions be made salient, however this salience can take the form of contextual salience, as well as linguistic salience via the presence of an overt modal like *will*. Both Blackfoot and English, I suggest, further contrast with languages like Javanese, which allow future reference even in contexts where the agent's plans and volitions do not seem salient (Chen et al. (Under Reviewa)).

At this point, we have accounted for the observation that *aahkama'p-*, in addition to *áak-*, allows for future interpretations. But what about the availability of future interpretations in the antecedent of conditionals?

Observation II	
Contexts allowing a future-interpretation (in the absence of <i>áak-</i>)	
(i) Conditional antecedents	
(i) Without <i>áak-</i> : Interpreted as future	
(ii) With <i>áak-</i> : Interpreted as future + volition	
(ii) Complement of <i>aahkama'p-</i>	✓

6.4.3 Accounting for Future-Oriented Conditional Antecedents

Schulz (2008) proposes that the function that conditional antecedents play - i.e., modal restriction - licenses prospective interpretations. Recall that conditional antecedents place a restriction on the worlds in the modal's domain of quantification: these must be worlds where the antecedent propo-

sition is true. Schulz (2008) points out that in order for a proposition, *p*, to be true in a given world, the world must be defined at least up to the point where *p* obtains. This is because definedness is a prerequisite for determining truth. All of the worlds where the antecedent proposition, *p*, is true at time *t*, are worlds where propositions are defined at time *t*. Using the antecedent proposition, *p*, as a restriction thus extends the temporal range of definedness in the modal claim at least up until the point where *p* obtains. Thus if the antecedent proposition is prospective, this effectively extends the temporal range of definedness in the modal claim into the future. The conditional antecedent, then, itself licenses prospective aspect, independent of the sort of modal it restricts.

The reader may question whether this additional explanation is required. After all, the conditional constructions we observed in chapter 5 were all conditionals whose consequents were headed by the modal *áak-* or *aahkama'p-*. That is, all of the conditionals were headed by modals that quantify over a set of worlds derived from a bouletically-ordered action modal base and a stereotypically-ordered circumstantial modal restriction. The set of worlds that the conditional antecedent restricts is thus already defined for the future.

We thus have two possible ways of accounting for the observation that conditional antecedents in Blackfoot modifying *áak-* and *aahkama'p-* claims can be interpreted prospectively. We can distinguish between the two analyses, however, by looking at the temporal properties of evidential conditionals. Evidential conditionals are not headed by action-dependent modals, and hence, we would not expect their antecedents to be interpretable as prospective given the analysis where the consequent modal licenses the prospective aspect. Given Schulz (2008)'s reasoning, however, whereby the restrictive nature of an antecedent licenses prospective aspect, we would predict that evidential antecedents can be interpreted as prospective. The data below suggests that Schulz (2008)'s reasoning is on the right track: evidential conditional antecedents in Blackfoot can be interpreted prospectively, as shown below.

(418) **Context:** My brother is trying to make cake for his girlfriend's birthday. He mixes ingredients together, and then puts the batter into the oven. Then half an hour later, he turns to me, eyes wide, and says he doesn't remember if he put sugar in the batter. Since people can smell whether something is sweet when it's baking, I say:

<i>kamómatapitsiyipokosi,</i>	<i>kito'ohpihkiit</i>	<i>náápiiniiwan</i>
kam-omatap-itsiyipoko-si,	kit-omohp-ihkiitaa	náápiiniiwan
if-start-sweet.vii-sbj;3,	2-assoc-bake.vai	sugar

'If it starts to get sweet, you added sugar.'

(419) **Context:** My sister is trying to make bread, but has a bunch of things to do at once. Once she mixes the dough and leaves it to rise she suddenly doesn't remember if she added the yeast. My mom tells her:

kamómatapomaahko'si, kito'ohpihkiit yeast
kam-omatap-omaahko-si, kit-omohp-ihkiitaa yeast
 if-start-big.VII-SBJ:3, 2-assoc-bake.VAI yeast

'If it gets bigger, you added yeast.'

Finally, recall that while *áak-* is not necessary to license prospective interpretations in a conditional, they are not barred from doing so. When *áak-* appears in the antecedent of a conditional, the antecedent expresses a claim with a volitional flavour - i.e., the presence of *áak-* in an antecedent results in conditionals which don't merely hypothesize about what would happen if the eventuality described by the antecedent were to occur, but rather what would happen if the eventuality described by the antecedent were compatible with the agent's plans or volitions. This is not surprising under the analysis given here, where conditional antecedents independently license prospective aspect. Because *áak-* is not required to license prospective aspect in the antecedent of a conditional, if *áak-* is present, its action-dependent properties will be highlighted. This follows via Gricean reasoning. In most contexts, *áak-* is required in order to license prospective aspect. In a context where *áak-* is not used to license prospective aspect (like the antecedent of a conditional), a hearer will assume that *áak-* is being used for some other relevant reason. Because the only semantics that *áak-* contributes is reasoning via the information made available in a volitionally-ordered action modal base and a stereotypically-ordered circumstantial modal base, the information in these modal bases is likely what the speaker is highlighting as relevant. This accounts for the volitional flavour of (381a) and (380a); as mentioned previously, the actions available to the agent are partially determined by the action's goals and desires. Highlighting these actions thus highlights these goals/desires, yielding a volitional flavour.

Observation II

Contexts allowing a future-interpretation (in the absence of *áak-*)

(i) Conditional antecedents

(i) **Without *áak-*:** Interpreted as future

✓

(ii) **With *áak-*:** Interpreted as future + volition

✓

(ii) Complement of *aahkama'p-*

✓

6.5 Volition, Epistemics and Temporal Orientation

The analysis I present in this chapter is focussed on the distribution of prospective and volitional interpretations associated with Blackfoot *áak-*, but with the exception of the lack of futurate constructions in Blackfoot, the Blackfoot data parallels the distribution of prospective and volitional interpretations associated with English *will*. We can thus propose a parallel analysis for English, where *will*, like *áak-*, is an inherently non-temporal action-dependent circumstantial modal that licenses a null prospective aspect.¹⁹⁴ With this parallel analysis in mind, I address an observation about English *will* made by Kaufmann (2005) regarding a correlation between temporal orientation and the presence/absence of a volitional flavour. I show how the analysis proposed in the previous section predicts exactly the sort of observation he makes.

6.5.1 Kaufmann (2005)'s Observation

Kaufmann (2005) observes that the volitional flavour of English examples like (420a) is lost when the antecedent modal has a stativized prejacent. Thus (420b), which is minimally different from (420a) in that the modal's prejacent is progressive, lacks the volitional flavour of (420a). The minimal pair in (421) shows the same correlation between a progressive prejacent and a lack of volitional flavour.

- (420) a. If he'll dance, it'll be good. hfill ✓VOL
b. If he'll **be dancing**, it'll be good. ×VOL
- (421) a. If she'll **rob** the bank, I'll drive the getaway car. ✓VOL
b. If she'll **be robbing** the bank, I'll drive the getaway car. ×VOL

This observed correlation between the aspectual properties of *will*'s prejacent and the presence of a volitional flavour is a mystery for accounts that, like Kaufmann (2005), treat *will* as purely circumstantial; Kaufmann (2005) leaves this as a puzzle for future research. I argue that this is exactly what we predict, however, given the action-dependent approach to circumstantial modals presented here. With a stativized prejacent, a null prospective aspect is not required to resolve the incompatibility between an instantaneous present evaluation time and an inherently non-instantaneous eventive. The antecedent in (420b) thus hypothesizes about the possibility of a dancing event coinciding with the current evaluation time, *t*, given (i) the actions available to the agent, *x*, at *t*, and (ii) *x*'s circumstances at *t*. But because actions are crucially dynamic, an action's

194. In section 6.6, I suggest that Blackfoot's lack of futurate constructions reflects a language-specific parameter setting. While a language like English allows plans/intentions to be accessed so long as they are contextually-salient, a language like Blackfoot requires that the access of plans/intentions be morphologically marked (e.g., by a modal). As the accessing of plans/intentions correlates with the licensing of prospective aspect, contextually-salient plans allow future interpretations in English where they do not in Blackfoot.

instantiation can only affect the possibility/necessity of events following *t*; the actions available to *x* at *t* cannot affect the possibility of a dancing event at *t*. Regardless of any action that the agent might take at time *t*, the state of affairs described by the prejacent (the ongoing dancing event) hold at time *t*. Thus, in the absence of prospective aspect, the quantification over actions becomes irrelevant, and the volitional action-dependent flavour of modals like *áak-* and *will* is lost. The reading that arises has the same informational content as a purely circumstantial reading.¹⁹⁵

Note that ‘purely circumstantial’ readings in the literature are usually associated with a prospective temporal orientation. Thus the quintessential example of a circumstantial reading (422a), has a prospective temporal orientation, in contrast to the epistemic reading in (422b), which has a coinciding temporal orientation.

(422) Examples adapted from Kratzer (1991)

- | | |
|--------------------------------------|----------------|
| a. Hydrangeas might grow here. | CIRCUMSTANTIAL |
| b. Hydrangeas might be growing here. | EPISTEMIC |

The term ‘purely circumstantial,’ as I use it here, however, is non-temporal. By ‘purely circumstantial,’ I mean one where the modal base restriction only involves the agent’s circumstances. This contrasts with the action-dependent circumstantial readings I have been discussing so far, where the modal base restriction involves both (i) the actions available to the agent, and (ii) the agent’s circumstances. This similarly contrasts with a purely epistemic reading where the modal base restriction only involves the evidence available the speaker. The two issues of whether a modal claim has a prospective temporal orientation, and whether the modal claim has a circumstantial vs epistemic modal base, are at least logically distinct, as represented in Table 6.5.¹⁹⁶

Whether all of these possibilities are made available to natural languages, or whether they are ruled out for independent reasons, is an empirical issue. For instance, consider the logical possibility of an epistemic reading with a prospective temporal orientation. This sort of modal claim would have truth conditions as follows: In all of the worlds compatible with the speaker’s evidence in *w* at *t*, *x* participates in a P-event at some time, *t'*, following *t*. If we make the assumption that a speaker cannot have evidence of the future events, this logical possibility could

195. I am not entirely certain what predictions an account like Copley (2002, 2009)’s makes with respect to this observation. Recall from chapter 3 that in Copley (2002, 2009)’s account, planning/volitionality is encoded as an ordering source on the circumstantial modal quantification expressed by *will*. She does not explicitly discuss how the future/prospective interpretations arise however. If we take an analysis in the style of Copley (2002, 2009), along with an analysis of a null prospective aspect as I have proposed here, we may be able to similarly account for Kaufmann (2005)’s observations: If we assume that volition/planning is inherently future-oriented, the absence of a prospective orientation would similarly result in an absence of the normal truth-conditional effect that the planning/volitional ordering source conveys.

196. There are many more possibilities for modal bases and temporal orientations, of course. These three modal bases and two temporal orientations are the only ones relevant for the discussion at hand, however.

Modal Base	Prospective TO	Overlapping/Coinciding TO
Purely Circumstantial	In all of the worlds compatible with x's circumstances in w at t, x participates in a P-event at some time, t', following t.	In all of the worlds compatible with x's circumstances in w at t, x participates in a P-event at t.
Action-Dependent Circumstantial	In all of the worlds compatible with (i) the actions open to x in w at t, and (ii) x's circumstances in w at t, x participates in a P-event at some time, t', following t.	In all of the worlds compatible with i) the actions open to x in w at t, and and (ii) x's circumstances in w at t, x participates in a P-event at t.
Epistemic	In all of the worlds compatible with the speaker's evidence in w at t, x participates in a P-event at some time, t', following t.	In all of the worlds compatible with the speaker's evidence in w at t, x participates in a P-event at t.

Table 6.5: Logical Possibilities for MB and TO Combinations (Where TP=t)

be practically ruled out.

Another issue that arises is whether each cell in table 6.5 represents truth-conditions that can be empirically distinguished. Consider, for instance, the difference between a purely circumstantial and epistemic reading with a coinciding temporal orientation. The issue is whether there is a difference between the worlds compatible with, on the one hand “the speaker’s evidence in w at t” and, on the other hand “the agent’s circumstances in w at t.” The speaker’s knowledge about the agent’s circumstances is likely gleaned from their evidence, making it difficult to determine whether a claim is based on an agent’s circumstances or the speaker’s evidence regarding the agent’s circumstances. While a speaker’s evidence regarding the agent’s circumstances in w at t, and the agent’s actual circumstances in w at t could be distinguished with hindsight - i.e., if the speaker had evidence at t that was later revealed to be misleading as to what the agent’s circumstances at t were like - it is difficult to distinguish between these two readings when the temporal perspective time is the present t_0 .¹⁹⁷ Thus the purported epistemic example in (422b) could be easily paraphrased in a purely circumstantial way: “There is a world compatible with the circumstances in w at t (e.g., the temperature, soil conditions, etc.,) where hydrangeas grow here at t.” The point to take away from this discussion is that while we can logically distinguish between the notions of modal base and temporal orientation, the two notions are often difficult to empirically disentangle. In what follows, I argue that the difficulty that arises in distinguishing

197. In earlier parts of this thesis (chapter 4) I have proposed for Blackfoot that epistemic and circumstantial modals differ in terms of what their temporal perspective time correlates to. More specifically, I have proposed that while circumstantial modals take the time provided by tense (or a higher scoping aspect) as their temporal perspective time, epistemic modals take a past-unbounded interval demarcated by the time provided by tense (or a higher scoping aspect) as their temporal perspective time. This correlates with different empirical properties in terms of the range of temporal perspective and temporal orientations allowed for circumstantial vs epistemic readings. The correlation between temporal perspective times and modal base I have proposed, however, is presented as a Blackfoot-specific property. It is not a logical necessity and the empirically observable temporal distinctions associated with the circumstantial/epistemic distinction in Blackfoot cannot be used as a diagnostic for the circumstantial/epistemic distinction in other languages.

between purely circumstantial and epistemic readings with present temporal perspectives also arises between action-dependent and purely circumstantial readings with overlapping temporal orientations.

Consider a modal claim like “He will dance,” where we assume the bare eventive prejacent is modified by a null prospective aspect. According to the action-dependent analysis presented here, “He will dance” asserts that all of the worlds compatible with (i) the actions available to the agent, x , at t , and (ii) x ’s circumstance’s at t , are worlds where at some time t' , following t , the agent participates in a dancing event. In a purely circumstantial analysis, “He will dance” would assert that all of the worlds compatible with the agent’s circumstances at t are worlds where at some time t' , following t , the agent participates in a dancing event. Note that the worlds compatible with x ’s circumstances at t are not the same as the worlds compatible with the (i) the actions available to the agent, x , at t , and (ii) x ’s circumstances at t . The action-dependent set of worlds is restricted to those worlds where the agent takes some action amenable to their volitions. The result of taking these actions could be what rules out worlds where the dancing does not occur. This is not the case for the purely circumstantial set of worlds - it cannot be an action taken at t that rules out non-dancing worlds. It must be the circumstances that hold at t . This results in a different range of contexts in which the action-dependent and purely-circumstantial analyses predict “he will dance” to be true. If all of the former (action-dependent) worlds are worlds where the agent participates in a dancing event, the hearer could infer that it is not the agent’s circumstances that ensure a future dancing event, but rather the agent’s volition towards taking particular actions. The truth-conditions are also compatible, however, with a context where it is the agent’s circumstances that ensure a dancing event - i.e., even if the agent is not committed to actions that lead to a future dancing event, all of the worlds where he does not dance are ruled out by his current circumstances. Thus, an action-dependent approach to “He will dance” predicts that it is felicitous and true in both of the following contexts:

(423) **A Action-Dependent Context:** Derek has been challenged to a breakdancing contest by a young up-and-coming dancer, Hansel. Derek could walk away, but he wants to prove that he still has what it takes.

B Purely Circumstantial Context: Derek has been brainwashed/conditioned by the evil Mugatu so that once he hears the song ‘Relax’ he begins a breakdance routine that will result in the assassination of the Prime Minister. The DJ has just started playing ‘Relax.’

If the truth-conditions of “He will dance” were framed as purely circumstantial, however, we would predict it to be felicitous in context B, but not context A, as in A the circumstances alone do not guarantee a future dancing event. The non-dancing worlds in context A are ruled out by the agent’s desire to take an action that will prove he still has what it takes.

Consider next a modal claim like “He’ll be dancing,” where the stativized prejacent is interpreted with an overlapping temporal orientation. According to the action-dependent analysis presented here, “He’ll be dancing” asserts that all of the worlds compatible with (i) the actions available to the agent, *x*, at *t*, and (ii) *x*’s circumstances at *t*, are worlds where the agent participates in a dancing event whose runtime overlaps with *t*. In a purely circumstantial analysis, “He’ll be dancing” asserts that all of the worlds compatible with the agent’s circumstances at *t* are worlds where the agent participates in a dancing event whose runtime overlaps with *t*. Again, the action-dependent set of worlds is distinct from the purely circumstantial set of worlds. The action-dependent set of worlds is restricted to those worlds where the agent takes some action amenable to their volitions. However, crucially, it cannot be the case that the result of taking these actions is what rules out worlds where there is no dancing at *t*. This is because actions are inherently dynamic - their instantiations take time, and any resulting effects of an action taken at *t* must take place after *t*. Whether or not a dancing event is currently going on during *t* will not be affected by the range of actions that an agent considers open to him. It must be the case that the agent’s circumstances in *w* at *t* are what rule out non-dancing worlds. The action-dependent circumstantial truth-conditions thus collapse with the purely-circumstantial truth-conditions. The volitional component associated with the action-quantification cannot practically affect whether or not the prejacent holds in the modal’s domain of quantification, thus the modal claim does not allow the hearer to infer (and hence the speaker to imply) anything about the how the possibility/necessity of the modal’s prejacent relates to the agent’s volitions. I propose that this is why stativized prejacentes like that in the antecedent of (420b) lack a volitional flavour.

6.5.2 So-called “Epistemic” Readings of *will*

We can make a related observation regarding the *áak*- examples in (376)-(378) which have stative(ized) complements. These are repeated in (424)-(426) below. These constructions are associated with translations that are often labelled as ‘epistemic’ uses of English *will*. I propose that these constructions are action-dependent circumstantial claims with present temporal perspectives and overlapping temporal orientations that have been mistakenly labelled as epistemic.

- (424) **Context:** My mom is babysitting my niece while my sister goes grocery shopping with me. My sister checks her watch and starts rushing us home because my niece is still nursing and it’s time for her feeding. She says:

anna Kaia áaksisttso’kini annohk
anna Kaia áak-isttso’kini-wa annohk
 DEM Kaia FUT-hungry.VAI-3 now
 ‘Kaia will be hungry by now.’

- (425) **Context:** There's a secret society, whose initiation process is secret. But rumours suggest that it involves a midnight run along Wreck Beach. Heather is being initiated into the secret society tonight, and I check my watch and see it's midnight. I know she'll never reveal the secret initiation process, so I'll never know for sure, but I figure:

annohk áakitáókska'si omi Wreck Beach
 annohk áak-it-á-okska'si-wa omi Wreck Beach
 NOW FUT-RL-IMPF-TUN.VAI-3 DEM Wreck Beach
 'She'll be running on Wreck Beach right now.'

- (426) **Context:** I told my sister I was going to bake a cake during the afternoon. In the evening, she's coming over and she's thinking excitedly:

áaksikaipisatsskiitaa
 áak-ikaa-pisat-ihkiitaa-wa
 FUT-PERF-fancy-bake.VAI-3
 'She will have made cake.'

- (427) a. She'll **rob** the bank. CIRC
 b. She'll **be robbing** the bank right now. "EPIST"

In the previous subsection I argued that the empirical difference between action-dependent circumstantial claims and purely circumstantial dependent claims collapses when we have an overlapping temporal orientation (i.e., when we lack a prospective temporal orientation). All of the cases in (424)-(426) are cases where the modal's prejacent is stative, or stativized, thus the dynamic action-dependent (and volitional) meaning associated with *áak-/ will* is lost. Recall that this is because the claims in (424)-(426) are about the possibility/necessity of the prejacent events occurring at the temporal perspective time *t*, given (i) the actions available to *x* in *w* at time *t* and (ii) *x*'s circumstances in *w* at time *t*. Because actions are inherently dynamic, their instantiations require time to occur, and any resulting effects of an action taken at *t* can only affect times after *t*. Whether or not the prejacent situation is ongoing at time *t* is unaffected by actions that have not yet taken place. An action-dependent circumstantial claim with an overlapping temporal orientation thus conveys little information about what sort of actions are currently open to the agent at *t*. The action-dependent circumstantial claim thus rules out the same context set worlds that a purely circumstantial claim would. In the previous section I argued that this is why an overlapping temporal orientation makes a volition-sensitive action-dependent claim read like a purely circumstantial (and hence volition-insensitive) claim.

Purely circumstantial readings, however, are not the only modal claims that convey little information about what sort of actions are currently open to the agent at *t*, given their volitions at *t*. An epistemic claim also lacks this sort of information, and in the previous section I also pointed out how it is difficult to distinguish between circumstantial and epistemic readings when the modal

claims have a present temporal perspective, because the speaker's knowledge of the agent's circumstances at t are likely based on the speaker's evidence at t . An action-dependent circumstantial claim with (i) a present temporal perspective and (ii) an overlapping temporal orientation (as I argue is represented by (424)-(426)) thus is difficult to distinguish from an epistemic claim with a similar present temporal perspective and overlapping temporal orientation. I propose that this is why such constructions have been labelled 'epistemic.'

We can thus consider two possible analyses of (424)-(426). One is that *áak-* and *will* in these contexts, where a present temporal perspective and overlapping temporal orientation coincide, take an epistemic modal base. This contrasts with all of the other uses of *áak-* and *will* where this particular temporal perspective and this temporal orientation do not coincide, wherein *áak-* and *will* take an action-dependent circumstantial modal base. The correlation between modal base and temporal properties would have to be motivated in some way, or stipulated.

The second possible analysis, as I have proposed here, is that all uses of *áak-* and *will* are action-dependent circumstantial claims, but that a present temporal perspective and overlapping temporal orientation result in truth-conditions that overlap with the sort of truth-conditions an epistemic claim would yield. The overlap in truth-conditions follows from (i) the inherently dynamic properties of actions and (ii) the difficulty in empirically distinguishing between a speaker's knowledge of an agent's circumstances and the speaker's evidence of such circumstances. I suggest that the latter analysis is less stipulatory, and hence preferable.

Note that it cannot be the case, at least for Blackfoot, that *áak-* freely takes either an action-dependent circumstantial or an epistemic modal base. Recall that I have proposed that circumstantial and epistemic modals in Blackfoot differ in terms of the kind of temporal perspective they are interpreted with respect to. While circumstantial modals take the time, t , provided by tense (or a higher scoping aspect) as their temporal perspective time, epistemic modals take $\epsilon(t)$, a past-unbounded interval right-demarcated by the time provided by tense (or a higher scoping aspect) as their temporal perspective time.¹⁹⁸ This correlates with different empirical properties in terms of the range of temporal orientations allowed for circumstantial vs epistemic readings. Consider a case where we have present tense t_0 merging above the modal. In chapter 4 section 4.5.2 we observed that Blackfoot epistemic modals like *aahk-* and *aahkam* can treat a bare eventive preajacent as having been modified by a null perfective aspect, so that the preajacent event is contained in the interval $\epsilon(t_0)$. If *áak-* could freely take an epistemic modal base, then we would similarly expect that *áak-* would take an extended interval $\epsilon(t)$ as its temporal perspective time when the modal claim is interpreted with respect to an instantaneous evaluation time like t_0 . A bare eventive preajacent should then be interpretable as having been modified by a null perfective aspect so that

198. Imperfective-marked ability attributions are the only case of an aspect scoping over a circumstantial modal that I have provided. These are discussed in more detail in chapter 7.

the prejacent event is contained in the interval $\epsilon(t)$. This is not the case, however. As we saw in (375), *áak-* with an eventive prejacent and instantaneous evaluation time always takes a prospective temporal orientation. Under the assumption that *áak-* is an action-dependent circumstantial modal whose temporal perspective time correlates with the higher merging tense, this follows: because the instantaneous evaluation time is incompatible with a perfective interpretation, the absence of overt aspect must be interpreted as prospective. Under the assumption that *áak-* can freely take an epistemic modal base, however, this restriction would be puzzling.

This sort of analysis is more difficult to rule out for English *will*, however. Epistemic modals in English, unlike epistemic modals in Blackfoot, require perfect complements in order for the prejacent event to be interpreted as being contained within a past-extended interval.

- (428) a. She must **have made** pie. EPISTEMIC MB
 b. She must make pie CIRCUMSTANTIAL MB, DEONTIC OS

Thus while I have proposed that Blackfoot epistemic modals lexically encode a sort of ‘Extended Now’ perfect interval $\epsilon(t)$ as their temporal perspective time within their denotations, this does not appear to be the case for English epistemic modals. We do not predict, as we did for Blackfoot, that bare eventive complements to an epistemic *will* could be interpreted so that the prejacent event is contained within $\epsilon(t)$, as no epistemic modals in English behave this way. It thus could be the case that *will* freely takes either epistemic or action-dependent circumstantial modal bases, where only an action-dependent circumstantial modal base will license the null prospective aspect. This would account for why *will* claims with prospective interpretations do not get epistemic-like readings. Cases where *will* does not take a prospective interpretation would be ambiguous between (the difficult to empirically distinguish) epistemic and circumstantial readings. This sort of analysis can account for the same range of data for English *will*, and also reflects Kratzer (1977)’s original claims regarding the apparent ambiguity of English modals. I will thus remain agnostic as to the best analysis for English *will*. Blackfoot *áak-* however, is better accounted for under an analysis wherein examples like (424)-(426) are action-dependent circumstantial claims. In addition to the temporal orientation argument provided above, we have no independent evidence to suggest that Blackfoot modals are ambiguous in terms of their modal base.

6.6 Remaining Questions and Conclusion

In this chapter I looked more closely at the consequences associated with the analysis for *áak-* “will” presented in chapter 4. In particular, I observed that *áak-* “will” is not in a 1:1 correlation with future interpretations. I observed that not only can future interpretations arise in the absence of *áak-*, but also *áak-* can make a claim about the possibility/necessity of a present eventuality. I proposed that these observations are exactly what we expect given the analysis for *áak-* “will”

presented in chapter 4 wherein *áak-* is an inherently non-temporal action-dependent circumstantial modal whose prospective temporal interpretations are actually the result of a null prospective aspect. I further argued that the volitional flavour (or lack thereof) associated with *áak-* in various conditional and temporal contexts is expected under the proposed analysis wherein the action's available to an agent are restricted in terms of the agent's plans/commitments.

The observations regarding the distribution of Blackfoot's future interpretations, as well as the distribution of volitional readings associated with *áak-*, very closely mirror the distribution of English future interpretations and the distribution of the volitional readings associated with *will*. For that reason, the analysis presented here for Blackfoot *áak-* can be imported nearly wholesale for English *will*. There was one crucial difference, however, in terms of the distribution of future readings. In the following section I discuss the question of why English, but not Blackfoot, allows for futurate constructions.

6.6.1 A Possible Parametric Difference: English and Blackfoot

Futurates are the point where Blackfoot and English empirically vary in terms of the correlation between semantically-future meanings and the presence/absence of the prospective-licensing modals *áak-* and *will*. Thus English allows progressive and simple present claims to be interpreted as describing a future event, so long as the events in question follow from contextually-salient plans or commitments (i.e., Kaufmann (2005)'s **CERTAINTY CONDITION** (CC)). The examples are repeated here: (429a) and (429b) are the simple present and progressive **FUTURATE** constructions, in contrast to the standard 'future' constructions in (430a) and (430b).

- (429) a. The death-row prisoner **dies** tomorrow at 5pm.
(SIMPLE FUTURATE)
- b. The new iphone **is being revealed** tomorrow at 12pm.
(PROGRESSIVE FUTURATE)
- (430) a. The death-row prisoner **will** die tomorrow at 5pm.
(SIMPLE FUTURE)
- b. The new iphone **is going to** be revealed tomorrow at 12pm.
(PROGRESSIVE FUTURE)

Blackfoot, in contrast, does not have a futurate construction. Recall that Blackfoot's imperative, which has the combined functional load of the English simple present and progressive, cannot describe future events, even when the Certainty Condition is satisfied. This was illustrated with examples (390) and (391).

I tentatively suggest a parametric difference in terms of whether a language requires reference to an ordering source (OS) to be morphologically marked. While a language like Blackfoot requires an overt modal (like *áak-*) in order to express reasoning that makes use of ordering sources like a bouletic ordering source (e.g., current plans/intentions), or a stereotypical ordering source, English allows you to make claims expressing this sort of reasoning so long as the relevant propositions in the ordering sources are contextually salient. This reflects the restricted contexts of use associated with futurates - i.e., Kaufmann (2005)'s Certainty Condition, whereby futurates are only felicitous if the agent's plans/intentions/scheduled actions are contextually salient. Contextually-salient plans/intentions/schedule-actions can be used to reason about the possibility/necessity of a future event in English, even in the absence of an overt modal signalling the OS-aided reasoning. In Blackfoot, however, an overt modal like *áak-* must signal that the claim is an instance of OS-aided reasoning.

(431) **Parameter Setting:** OSs in English accessible via:

1. Contextual Salience: ✓
2. Linguistic Encoding: ✓

(432) **Parameter Setting:** OSs in Blackfoot accessible via:

1. Contextual Salience: ×
2. Linguistic Encoding: ✓

I further suggest that this parametric difference is reflected in a difference between the contexts in which evidentially-interpreted conditionals can be used in Blackfoot and English. Evidentially-interpreted conditionals are conditionals where the conditional antecedent is interpreted as evidence for the truth of the consequent. An example of this sort of conditional is given in (433).

(433) **Context:** My sister calls us while we're out, saying she wants to bake a pie, but is having trouble finding the butter. We tell her to check the freezer, although we warn her it's a mess, and hard to find things in. When we get home, the kitchen smells like pie, so I remark:

kamikaihkiitaasi sitokihkiitaan, iihkoonim omi iihhtáistsikóóhkimo'pi
kam-ikaa-ihkiitaa-si sitokihkiitaan, ii-ohkooni-m omi iihhtáistsikóóhkimo'pi
 if-bake.VAI-SBJ:3 pie, ic-find.VTI-3:0 DEM butter

'If she baked a pie, she found the butter.'

Kratzer (1989, 2012) suggests that these kinds of conditionals in English are best analyzed as having a null epistemic modal which licenses the conditional antecedent. I assume that the same

analysis could be proposed for Blackfoot. Blackfoot evidential conditionals, however, appear to have a more restricted distribution than their English counterparts. The relevant data is shown below. (434) is a case where the context is such that the antecedent acts as evidence for a habitual claim. Whereas the English target “If he packs his shoes, he runs (habitually)/is a runner” is acceptable (at least to some speakers), the Blackfoot approximation is not.

- (434) **Context:** My dad claims that he’s been going running regularly. We’re a little skeptical, thinking he might just be saying that, to get us off his back about exercising. Since we’re going on a little vacation, we decided that we’ll be able to tell if he’s truthful by what he packs, because real runners will pack their shoes with them.
Target: If he brings his shoes, he’s a runner.

kámohpaatoosi *matsikíístsi*, *áókska’si*
kam-ohp-aaat-oo-si matsikin-istsi á-okska’si-wa
if-assoc-move.vrt-go.VAI-SBJ:3 shoe-0PL IMPF-RUN.VAI-3
‘If he brought his shoes, he runs/is a runner.’

The example in (435) is a case where the antecedent acts as evidence for the universal claim represented by the consequent. Whereas the English target ‘If the next card is red, all of the cards are red’ is acceptable, the modal-less Blackfoot example in (435a) is unacceptable.

- (435) **Context:** I suspect that the deck of cards in front of me is rigged, so that they’re all red. But I’ll turn over one last card before making my conclusion.

a. # *amo kaahtsa’tsii* *kamomáóksinattsisi* *áóhkanomaohksinattsiyaa*
amo kaahtsa’tsi-yi kam-omaohksinattsi-si á-ohkana-omaohksinattsi-yi-aawa
DEM card-0 if-red.VII-SBJ:3 IMPF-all-red.VII-3pl-DTP

Target: ‘If that card is red, they’re all red.’

b. *amo kaahtsa’tsii* *kamomáóksinattsisi* *áakohkanomaohksinattsiyaa*
amo kaahtsa’tsi-yi kam-omaohksinattsi-si áak-ohkana-omaohksinattsi-yi-aawa
DEM card-0 if-red.VII-SBJ:3 FUT-all-red.VII-3pl-DTP

‘If that card is red, they will all be red.’

I propose that the relevant difference between acceptable cases like (433) on the one hand, and unacceptable cases like (434) and (435) on the other hand, can be framed in terms of the sort of reasoning required to make the claim represented by the consequent. While the former (acceptable) kind of case is a type of deductive reasoning, the latter (unacceptable) cases are a type of inductive reasoning.¹⁹⁹ I propose that inductive reasoning involves reasoning based on the sort of propositions present in a stereotypical ordering source. The reason why (434) and (435) are unacceptable without an overt modal, then, is because they reflect conclusions based on the information in a

199. This discussion on deductive vs inductive logic is based on the introductory chapters of Rips & Adler (2008) and Hacking (2001).

stereotypical OS, but they lack the overt modal necessary to signal OS-based reasoning in Blackfoot.

Deductive inferences are conclusions that are entailed by the established premises. This means that an assertion of a conclusion arrived at via the deductive inference does not change the context set by removing any of the possible worlds that are candidates for the real world (although the assertion may make the interlocuters aware of how the context set has already changed). Inductive inferences, on the other hand, are not entailed given the established premises; rather, inductive inferences are *probable* given the established premises. They make claims about a given population, based on information about a sample from that population (or vice versa). These sorts of claims rely on previous experiences, and generalizations over these previous experiences. For instance, consider a bush where in 2004, I observed that it bloomed with yellow flowers. It didn't bloom in 2005, but it bloomed again in 2006. In 2007 it failed to bloom, but in 2008, it did. From this, I could conclude that every two years, the bush flowers. I could then infer that 2003 was a year where the bush didn't flower, and that 2015 will be a year where the bush won't flower. The major assumption underlying inductive claims was labelled by Hume as the "Principle of Uniformity of Nature." This is the assumption that the future is conformable to the past.

The habitual/generic claim in (434), and the universal claim in (435) are both instances of inductive inference. The conditional claim that my father habitually runs (if we see him pack his shoes) is based on my previous experience with runners, who are the only people who always pack their running shoes with them to go on runs during vacation. And similarly, the conditional conclusion that all of the cards are red is based on my previous experiences with flipping over a card (and plausibly my previous exposure to hack magicians). These conditional claims are reasonable claims, but they could be false. Even if my father packs his shoes, he may not be a regular runner (perhaps he packed them because his other shoes need to be resoled). Even if the next card turns out to be red, it doesn't necessarily mean that all of the cards are red (maybe it is just a fluke that I keep picking red cards). This contrasts with the conditional claim made in (433). Because we know that my sister needs butter to make a pie, the only worlds where she managed to make a pie, are worlds where she first found the butter.²⁰⁰

I suggest that the generalisation that Blackfoot modal-less evidential conditionals can only be used to make deductive, but not inductive claims, follows from the same parametric difference I proposed to account for why Blackfoot lacks futurate constructions: Blackfoot differs from English in that a stereotypical ordering source (like a bouletic ordering source) cannot be accessed without an overt modal. A stereotypical ordering source, which orders worlds according to "the normal course of events" (Kratzer (1981), Portner (1998), a.o.), I suggest, is what encodes Hume's Unifor-

200. The example was given in a context where I had been telling my language consultant how I had not been able to find lard to make a pie crust, so a lard-based pie crust was already ruled out. Subsequent internet research suggests that some people in fact make pies using methods I had not considered (i.e., using oil!). I will have to assume that possible worlds where my sister uses these sorts of atypical methods were already ruled out.

mity assumption - i.e., it relates the various blooming and non-blooming years to universal/generic propositions like "that bush flowers every two years."²⁰¹ This sort of connection, I suggest, which is associated with a stereotypical ordering source, is required to associate the evidence described by the conditional antecedent to the generalized claim described by consequents like "my father is a runner" or "all of the cards are red." If Blackfoot cannot access a stereotypical ordering source without an overt modal, it cannot access this sort of connection, which could account for why the habitual/generic claim in (434), and the universal claim in (435), cannot be expressed as modal-less evidential conditionals. English, on the other hand, I suggest, can access a stereotypical ordering source (and the required connection between exemplars and a universal/generic claim) without an overt modal, accounting for why the English translations for (434) and (435) are acceptable.

6.6.2 Summary and Conclusion

In this chapter I have argued that apparent form-meaning mismatches with respect to Blackfoot's future morpheme *áak-*, and semantically future interpretations are not mismatches at all, but follow from the analysis originally presented in chapter 4 where *áak-* is an action-dependent circumstantial modal with no independent temporal contribution. The systematic association of *áak-* with future interpretations is rather derived from the fact that the action-dependent circumstantial semantics of *áak-* are precisely what is required in order to license a null prospective aspect.

The majority of the data generalisations I have presented regarding Blackfoot *áak-* can also be used to describe English *will*; I have suggested throughout that the analysis proposed for Blackfoot *áak-* can similarly account for the behaviour of English *will* - i.e., that it actually has no temporal contribution, but that its action-dependent circumstantial meaning provides exactly the sort of context required to license a null prospective aspect. A non-temporal semantics for English *will*, while uncommon for synchronic analyses, is not entirely alien; English *will* derives from a non-temporal volitional morpheme, and is often said to retain its original volitional readings in various contexts (Aijmer (1985)). A historical account where *will* began as a purely non-temporal volitional main verb, and then acquired a future temporal flavour, finally transforming into a modal with temporal and mostly non-volitional meaning cannot account for the systematic correlation of *will*'s non-volitional readings with stative complements, however. The analysis given here, in contrast, offers a semantically-driven synchronic account for the observed correlation between volition and temporal orientation. While contexts of use for *will* have definitely changed as *will* has been grammaticalized from a main verb to a modal auxiliary, the account I have presented is not one where the change in the contexts of use correlates with a change in the underlying semantics of *will*. Rather, the different contexts of use must correlate with some other change in the semantic system. Whether this change lies in the postulation of (or a change in the underlying semantics

201. I assume that the non-generalized propositions representing knowledge of particular blooming and non-blooming occurrences are contained in the epistemic modal base, as opposed to being contained in a stereotypical ordering source.

of) a null prospective aspect with particular licensing conditions, or in some other aspect of the temporal-aspectual architecture of the grammar, I leave as a question for further research.

Chapter 7

Actuality Entailments (and their imposters)

The dragon had crisped him thoroughly. He was absolutely sure now that if he lost a life in an Anywhere, it somehow did not count and he had to lose that life properly in his own world, in a way that was as like the death in the Anywhere as possible.

Excerpt from *The Lives of Christopher Chant*, by Diana Wynne Jones.

7.1 Introduction

In this chapter, I discuss the distribution of actuality entailments in Blackfoot. Actuality entailments, as I first described in chapter 3, are a phenomenon whereby a modal claim like (436a) entails the truth of its prejacent, as represented by the non-modal claim in (436b). Thus a claim like (436a) can only be truthfully used in a context where its non-modal equivalent (436b) is also true.

(436) **Context:** Aerin had fought dragons before, but there were always small dragons with small brains. Maur the Black Dragon was much older, bigger and cleverer. Still, with luck and help from her trusty horse Talat, Aerin managed to defeat Maur.

- a. Aerin was **able** to slay Maur the Black dragon. TRUE
- b. Aerin slayed Maur the Black dragon. TRUE

Recall that this behaviour is surprising given the standard approach to modal elements like *able*. Modal elements like *able* are usually analyzed as quantifiers over possible worlds in order to account for the observation that (the majority of) modal claims can be used in contexts where the modal claim's non-modal equivalent does not hold true. This is illustrated for the modal *might* in (437). The modal claim in (437a) can be used in the given context, where the non-modal equivalent (437b) is false.

(437) **Context:** Keladry's maid Lalasa was attacked by one of Keladry's fellow squires, Vinson. Keladry wanted to report the attacker to the authorities, but Lalasa begged her not

to because Lalasa was afraid it would cause her more trouble with her attacker in the future.

- a. Keladry **might** have reported Vinson to the authorities. TRUE
- b. Keladry reported Vinson to the authorities. FALSE

In chapter 3, I summarized the Kratzer (2011)/Matthewson (2012) approach to actuality entailments, which depended on the notion of a counterpart. In this chapter, I provide an analysis for Blackfoot actuality entailments that depends upon similar ingredients (i.e., the presence/absence of prospective aspect, and a temporally-constrained similarity requirement), but does not rely upon counterparts. The analysis proposed here instead relies upon (i) universal quantification over worlds for ability attributions (as I have adopted in chapter 4), and (ii) the intuition that when we make a modal claim about possible worlds, we assume that the actual world is one of these possible worlds (cf. Copley (2006)'s notion of Efficacy). I take a Kratzer (2012)-inspired take on Efficacy, however, formulating Efficacy as a temporally-constrained identity requirement between (i) the world of evaluation and (ii) a world in the modal's domain of quantification (similar to her counterpart relation), where the identity requirement only holds for the modal's temporal perspective time. This, in conjunction with the previously proposed licensing conditions for prospective aspect (chapter 6), and the perfective containment temporal orientation that the ability modal *ohkott-* takes (chapters 4 and 5), derives the observed pattern of actuality entailments in Blackfoot.

This chapter is organized as follows. First I discuss the main empirical property associated with actuality entailments - i.e., the phenomenon whereby a modal assertion commits the speaker to the existence of a real-world event. I then review the temporal contexts in which Blackfoot's ability modal, *ohkott-*, displays this property, arguing that Davis et al. (2010)'s identification of actuality entailments in Blackfoot fails to properly distinguish between true actuality entailments (AEs) and what I argue to be (temporally-distinct) verifying instances (VIs).

After providing an analysis for deriving actuality entailments, I consider some consequences and predictions of the analysis - namely, that actuality entailments should not be constrained to ability attributions, but to any modal claim that (i) makes a universal claim and (ii) has a temporal orientation whereby the prejacent's instantiation time is contained within the temporal perspective time. This leads to a prediction whereby strong epistemic *aahk-* and "future" *áak-* claims, so long as they take the proper temporal orientation, should be associated with AEs. I then point out that the sort of data one uses to diagnose actuality entailments for circumstantial modals involve the same sort of judgements underlying the observation that strong epistemic modals are subject to Moore's Paradox (cf. Copley (2006)) - i.e., the observation that strong epistemic modal claims cannot be followed by claims of ignorance or falsity with respect to the truth of the prejacent proposition. The analysis proposed in this chapter thus allows us to unify these two phenomena. The analysis also leads to the prediction that imperfective claims in Blackfoot, which encode *partial* temporal

containment, should have *partial* actuality entailments. I argue that this prediction is borne out.

I conclude this chapter with an analysis for the required verifying instances observed by Davis et al. (2010). I propose that Blackfoot's ability modal has a lexically encoded restriction on the evidence a speaker has for a claim. I then show that the presence/absence of verifying instances for ability attributions are exactly what we expect given the previous chapter's discussion on the licensing of prospective aspect (chapter 6) and what I have proposed regarding temporal intervals associated with evidence (chapters 4 and 5) - i.e., that evidence is cumulative, and thus always associated with a past-extended interval.

7.1.1 Actuality Entailments: Literature Recap

Bhatt (1999, 2006) first observed that perfectly-interpreted ability attributions in Hindi and English, despite being allegedly modal claims, are associated with an entailment that the situation described by the modal's prejacent occurs in the actual world. Hacquard (2006) observed the same pattern in French and Italian. Examples from Hacquard (2006) are given below.

(438) a. PERFECTIVE ASPECT (with actuality entailment)

Pour aller au zoo, Jane a pu prendre le train
to go to zoo, Jane **have can.PST.PFV** take the train

'To go to the zoo, Jane was able to take the train.'

(Only OK in contexts where Jane took the train in w_0 .)

b. IMPERFECTIVE ASPECT (no actuality entailment)

Pour aller au zoo, Jane pouvait prendre le train
to go to zoo, Jane **can.PST.IMPF** take the train

'To go to the zoo, Jane could take the train.'

(OK if Jane took the train in w_0 , or didn't.)

This phenomenon, whereby a modal claim entails the truth of its a non-modal counterpart, is called an actuality entailment. An informal definition is provided in (439).

(439) **Actuality Entailment (AE)**

When a modal claim entails its non-modal equivalent:

MOD $p \Rightarrow p$

The perfective/imperfective generalisation that Bhatt and Hacquard make regarding the distribution of actuality entailments, however, has been called into question by Mari & Martin (2007). They observe that actuality entailments fail to arise in French with circumstantial modals when the temporal orientation is prospective. Actuality entailments only arise with anterior or coincident

temporal orientations. The revised generalisation that actuality entailments are only associated with non-prospective temporal orientations was taken up by Kratzer (2011) and later adopted by Matthewson (2012). Kratzer (2011) proposed that circumstantial modals, in addition to quantifying over possible worlds, quantify over counterparts of the individual arguments in the modal's prejacent - i.e., an ability modal like *be able to* in (440) requires that (there is a world compatible with Miles' circumstances in the actual world where) a counterpart of Miles rescues his brother. In the formula below, counterparts are formalized as individual-time pairs, $\langle x, t \rangle$.

- (440) a. Miles was able to rescue his brother.
 b. $\llbracket be\ able\ to \rrbracket^{h,c} = \lambda R.\lambda t.\lambda x.\exists x'\exists t'[\langle x', t' \rangle \in CP\langle x, t \rangle \& R(x')(t')]$ Taken from Kratzer (2011)
 c. $\llbracket be\ able\ to \rrbracket^{h,c}(\text{rescue his brother})(t_1)(\text{Miles}) =$
 $\exists x'\exists t'[\langle x', t' \rangle \in CP\langle \text{Miles}, t_1 \rangle \& \text{rescue-his-brother}(x')(t')]$

There is a counterpart of Miles in a possible world, whose circumstances exactly matched Miles' circumstances during t_1 , and this counterpart rescued his brother during t_1 .

The counterpart relation is (i) very strict, and (ii) relativized to the modal's temporal perspective time (as shown in the denotation for *be able to* provided in (b)). The strictness means that Miles' counterpart must be a very good counterpart. So good, in fact, that anything Miles does, Miles's counterpart must do. And if Miles' counterpart (call him 'Miles II') is similar enough to Miles to be a counterpart of Miles, this means that Miles must be similar enough to Miles II in order to be a counterpart of Miles II. Given the strictness of the counterpart relation, this means that anything Miles II (Miles' counterpart) does, Miles must also do. Thus, if Miles' counterpart rescued his brother, this means that Miles, being so similar to this counterpart, must have likewise rescued his brother. This derives the actuality entailment. The relativization to the modal's temporal perspective time is what accounts for the distribution of actuality entailments. Because the strict counterpart relation need only hold for the modal's temporal perspective time, we only derive an actuality entailment if the modal's prejacent situation is contained within the modal's temporal perspective time. If the prejacent situation takes place outside of the modal's temporal perspective time, Miles and his counterpart are no longer required to be so similar that they do the same things. Thus while Miles' counterpart might save his brother, there is no way to guarantee that Miles does. Prospective aspect, which shifts the prejacent's instantiation time to a time following the modal's temporal perspective time, thus avoids an actuality entailment.

The analysis that I provide in this chapter is very similar to the one that Kratzer (2011) provides, in that it relies on the presence/absence of prospective aspect. However, unlike the one that Kratzer (2011) provides, it does not rely on a similarity requirement holding between counterparts of type e. I instead formulate Copley (2006)'s notion of Efficacy in a way so that it imposes a parallel kind

of similarity requirement on the worlds in the modal's domain of quantification and the actual world w_0 . This allows me to unify the actuality entailments associated with ability attributions with Copley (2006)'s approach to the non-cancellability associated with English epistemic *must* (as well as the non-cancellability associated with Blackfoot *aahk-*). It should be noted, however, that the analysis presented here cannot account for the range of actuality entailments documented for French (e.g., Mari & Martin (2009)).²⁰²

In the following subsections, I show the temporal/aspectual contexts in which Blackfoot's ability modal is associated with actuality entailments (or what appear to be actuality entailments). An important thing to keep in mind is the question of whether the "actuality entailment" in question is a true actuality entailment - i.e., is it the case that the modal element's *prejacent* event is required to occur in w_0 ? Or is it a different sort of phenomenon? In what follows I will argue that by carefully outlining the criteria associated with an "actuality entailment," we can (i) identify phenomena that have not previously been defined as "actuality entailments" as fitting the relevant criteria (and thus following from the same analysis), and (ii) identify phenomena that *have* been previously categorized as "actuality entailments" as not fitting the relevant criteria (and consequently not requiring explication in terms of the same analysis). More specifically, I will argue that the observation that strong epistemic modals (in Blackfoot and English) are subject to Moore's Paradox follows from an analysis whereby strong epistemic modal claims are associated with actuality entailments. I will also argue that Davis et al. (2010)'s surprising observation that an imperfective-marked *ohkott-* is associated with actuality entailments is only true on a superficial level; when the temporal instantiation of the event in question is taken into account, the phenomenon in question should not be categorized as an actuality entailment, but rather as a required "verifying instance."

7.1.2 Blackfoot AEs and VIs

Davis et al. (2010)'s main goal was to determine whether the generalisation Bhatt (2006) and Hacquard (2006) observe holds for more crosslinguistically diverse languages. Their conclusion was that the correlation between perfective/imperfective and AE/no-AE observed by Bhatt (2006) and Hacquard (2006) did not hold for all languages. Blackfoot was presented as a counterexample to Bhatt (2006) and Hacquard (2006)'s generalisation. The data in (441) replicates part of their observations: a (past) perfective ability attribution in Blackfoot is infelicitous in a context where the *prejacent* event did not actually occur.

202. For instance, Mari & Martin (2009) note that the presence/absence of actuality entailments correlates with whether or not the circumstantial modal's infinitive *prejacent* is eventive or stative, where the modal claims with stative *prejacent*s lack AEs. My analysis actually predicts that modals with stative *prejacent*s (which do not trigger prospective aspect) are subject to AEs, and I then argue that this prediction is borne out by data from English and Blackfoot. The French data is thus outside of the range of my analysis.

(441) **Context:** Imagine that there is a genetic disorder, where people with a specific mutated gene never feel full. Two babies are born, and they seem to continually want their mother’s milk, and we’re worried.

... **Mini Context A:** One set of parents decide to pay for a blood test to determine whether their baby has the requisite gene. The blood test for that baby indicates that it doesn’t have that disorder, so we conclude “He CAN get full!”/“He CAN be full!”

iihkottookoyi
 ii-ohkott-ookoyi-wa
 ic-ABLE-be.full.VAI-3

Target: ‘He was able to get full.’

PERFECTIVE

The more surprising claim was that Blackfoot ability attributions appear to have actuality entailments in imperfective cases as well. Blackfoot ability attributions marked with the *imperfective* aspect are likewise infelicitous in contexts where there has not been an event of the type described by the ability attribution’s prejacent. This is illustrated with (442a). In the same context, where the baby has not yet become full, the imperfective-marked ability attribution is infelicitous. In order to felicitously make an ability attribution in such a context, where we can infer based on solid evidence that the baby in question has the requisite ability, but no event as described by the modal’s prejacent has occurred, the future modal *áak-* is required, as shown in (442b).

(442) **Context:** Imagine that there is a genetic disorder, where people with a specific mutated gene never feel full. Two babies are born, and they seem to continually want their mother’s milk, and we’re worried.

... **Mini Context A:** One set of parents decide to pay for a blood test to determine whether their baby has the requisite gene. The blood test for that baby indicates that it doesn’t have that disorder, so we conclude “He CAN get full!”/“He CAN be full!”

a. # *áóhkottookoyi*
 á-ohkott-ookoyi-wa
 IMPF-ABLE-be.full.VAI-3

Target: ‘He can be full.’

IMPERFECTIVE

b. *áakohkottookoyi*
 áak-ohkott-ookoyi-wa
 FUT-ABLE-be.full.VAI-3

‘He can get full.’ (or lit. ‘He will be able to be full’)

FUTURE

Davis et al. (2010) concluded from their data that actuality entailments in Blackfoot are not conditioned by the perfective/imperfective distinction that Bhatt (2006) and Hacquard (2006) report. They concluded that Blackfoot ability attributions, regardless of their aspectual marking, are associated with actuality entailments. I argue, however, that a more careful look at the data

does not warrant this conclusion. In particular, I argue that the real-world event required to make the imperfective ability attribution in (442a) felicitous is not an actuality entailment, but a required **VERIFYING INSTANCE**, where a verifying instance represents evidence of the subject's ability. While actuality entailments necessarily involve the real-world occurrence of the prejacent event, verifying instances do not. Verifying instances, as evidence for the ability attribution, only need involve the real-world occurrence of an event with the same sort of properties as the prejacent event. While actual real-world occurrence of the prejacent event *can* satisfy the requirement for a verifying instance, it is not the only sort of event that can do so.

The data in (443) suggests that the determining factor regarding felicity of the perfective and imperfective-marked ability attributions is indeed the absence or presence of a verifying instance. Mini Context B in (443) differs from Mini Context A in (441) and (442) in that we have observed the baby in question becoming full - i.e., we have a verifying instance. The perfective and imperfective forms in (443a) and (443b) are judged felicitous.

(443) **Context:** Imagine that there is a genetic disorder, where people with a specific mutated gene never feel full. Two babies are born, and they seem to continually want their mother's milk, and we're worried.

... **Mini Context B:** We're about to do the test on the other baby, but before we do, we hear him stop crying for milk, and then we see him actually refuse to drink more. We exclaim: "He CAN be full!"/"He CAN get full!"

a. *iikhkottookoyi*
ii-ohkott-ookoyi-wa
ic-ABLE-be.full.VAI-3

'He was able to get full.'

PERFECTIVE

b. *áóhkottookoyi*
á-ohkott-ookoyi-wa
IMPF-ABLE-be.full.VAI-3

'He can be full.'

IMPERFECTIVE

The main empirical difference between actuality entailments and verifying instances is their temporal properties. While actuality entailments involve the existence of a real-world event with the same temporal orientation as the modal claim's prejacent event (as the actuality entailment is about the modal's prejacent event), verifying instances are less temporally constrained. A verifying instance can precede the temporal interval about which the ability attribution is made. I propose that Davis et al. (2010) mistakenly labelled the required past verifying instance in the imperfective case as an actuality entailment. In the perfective cases, the event that is the verifying instance *is* the prejacent event - they both have the same temporal location. It is a true AE as per the definition in (439). In the imperfective case, however, the verifying instance must be a past event, while the assertion makes a claim about a possible future event (taking place in the relevant accessible

worlds). Consider, for example, the following example, where we have a past verifying instance of my uncle having drawn a portrait of my mother, but no possibility for any future instances of such an event. The fact that the imperfective-marked ability attribution in (444a) is infelicitous suggests that the verifying event and the prejacet event are temporally distinct events. This contrasts with the perfective and felicitous (444b). (444c), marked with *aiissohk* “used to” is also a felicitous alternative to the imperfective ability attribution.

(444) **Context:** My uncle has been taking drawing lessons all of his life, and always had a knack for drawing likenesses of people. The last thing he drew was a portrait of my mother. Now, however, he has arthritis, and his hands shake too badly to draw.

- a. # *áóhkottsina* *anni* *niksisst*
á-ohkott-sina-yii *ann-yi* *n-iksisst*
IMPF-ABLE-draw.VTA-3:3' **DEM-3'** 1-mother
 'He can draw my mother.'
- b. *iihkottsina* *anni* *niksisst*
ii-ohkott-sina-yii *ann-yi* *n-iksisst*
IC-ABLE-draw.VTA-3:3' **DEM-3'** 1-mother
 'He was able to draw my mother.'
- c. *áíssohkohkottsina* *anni* *niksisst*
áíssohk-ohkott-sina-yii *ann-yi* *n-iksisst*
used.to-ABLE-draw.VTA-3:3' **DEM-3'** 1-mother
 'He used to be able to draw my mother.'

The contrast between (445) and (446a) likewise shows that an imperfective-marked ability attribution requires the possibility of a future P-event (as in (445)) in order to be felicitous. When there is no possibility of a future P-event, however, (as per the context in (446)), an imperfective-marked ability attribution is infelicitous; perfective or *aiissohk* “used to” modified ability attributions, as in (446b, c, d), are offered instead.

(445) **Context:** There's a man who learned how to read Cree syllabics when he was younger. I know this because I once brought him a letter written in the syllabics and he read it.

- a. *oma* *ninaa* *áóhkottokstoom* *asináisinaaksin*
om-wa *ninaa* *á-ohkott-okstoo-m* *asinaa-sinaakssin*
DEM-3 **man** **IMPF-ABLE-read.VTI-3:0** **cree-writing**
 'That man can read Cree writing.'
- b. *oma* *ninaa* *iihkottokstoom* *asináisinaaksin*
om-wa *ninaa* *ii-ohkott-okstoo-m* *asinaa-sinaakssin*
DEM-3 **man** **IC-ABLE-read.VTI-3:0** **cree-writing**
 'That man was able to read Cree writing.'

(446) **Context:** Now, however, he's gone blind. You find a manuscript written in Cree and ask me if I know anyone who can read it. I say:

a. # *oma ninaa aohkottokstoom asináisinaaksin*
 om-wa ninaa á-ohkott-okstoo-m asinaa-sinaakssin
 DEM-3 man IMPF-ABLE-read.VTI-3:0 cree-writing

'That man can read Cree writing.'

b. *oma ninaa iihkottokstoom asináisinaaksin*
 om-wa ninaa ii-ohkott-okstoo-m asinaa-sinaakssin
 DEM-3 man ic-ABLE-read.VTI-3:0 cree-writing

'That man could read Cree writing.'

c. *aissohkóhkottokstoom asináisinaaksin*
 aissohk-ohkott-okstoo-m asinaa-sinaaksin
 used.to-ABLE-read.VTI-3:0 cree-writing

'He used to be able to read Cree writing.'

The data in (445) and (446) suggest, as I assumed in chapter 4, that ability attributions in Blackfoot are truly modal; when marked with the imperfective, ability attributions can make a modal claim about a future event/situation, which (like the events asserted by the non-controversially modal *áak-* or *aahkama'p-* marked claims), may not come to pass in w_0 . This contrasts with an analysis where *ohkott-* is merely an implicative verb, as proposed by Bhatt (2006) for English *able to*. Bhatt (2006) proposes that actuality entailments arise because ability morphemes like *able to* are implicative verbs like *manage to*, which entail the truth of their complement. Non-implicative uses of *able to* are due to the presence of a null (modal) generic operator. Like Reis Silva (2009a), however, I reject this sort of non-modal analysis for Blackfoot *ohkott-*. If *ohkott-* were merely an implicative verb, then future-marked ability attributions like (447a) should not truth-conditionally differ from future marked eventive claims like (447b) in terms of the speaker's commitment towards the preadjacent event's future occurrence. But this is not the case - present perspective *áak-* claims like (447b) commit the speaker to the event occurring in the future; if it does not occur, then the speaker must admit they were mistaken. But present perspective *áak-* claims like (447a), where *áak-*'s preadjacent is modified with ability *ohkott-*, lack this sort of commitment. This difference would be surprising if *ohkott-* were an implicative verb that entailed the truth of its preadjacent.

(447) a. *áakohkottsspiyi*
 áak-ohkott-ihpiyi-wa
 FUT-able-dance.vai-3

'He can dance/he will be able to dance.'

b. *áakihpiyi*
 áak-ihpiyi-wa
 FUT-dance.vai-3

'He will dance.'

With the assumption that *ohkott-* is indeed modal, the seeming lack of modality in its perfective uses, then - i.e., the actuality entailment - requires explanation.²⁰³

I also conclude from (445) and (446) that imperfective ability attributions in Blackfoot don't have true AEs as per the definition in (439), repeated below in (448).

(448) **Actuality Entailment (AE)**

When a modal claim entails its non-modal equivalent:

$$\text{MOD } p \Rightarrow p$$

The reasoning can be summarized as follows: We can theoretically distinguish between two events:

1. an event asserted to occur in some possible world (the modal event), and
2. an event required to occur in the actual world (the w_0 event).

While in the perfective case both of these events are past events, and can thus be identified as the same event, this is not so for the imperfective case. In the imperfective case, the modal event is a possible future event, while the required real-world event is a past event. This means these cannot be identified as the same event. Because the non-modal equivalent of an imperfective ability attribution would assert the existence of a future event, but the entailment involves a real-world past event, the imperfective ability attribution does not actually entail the truth of its non-modal equivalent.²⁰⁴ Given the definition of 'actuality entailment' in (439), this means that whatever is causing the infelicity of the imperfective examples, it is not an actuality entailment. I propose to account for the infelicity of the imperfective examples in terms of a required verifying instance: Blackfoot ability attributions require a previous verifying instance of their complement event, and the contexts where the imperfective ability attributions are infelicitous lack such a verifying instance.

The full set of data is provided below in (449) (450) and (451); some of the data in (451) was already presented in (444).

203. My claim that the ability attribution can make a future claim does not equate with a claim that *ohkott-* can encode a prospective temporal orientation. I proposed in chapters 4 and 5 that the temporal orientation encoded by *ohkott-* is distinct from that of *áak-* and *aahkama'p-*: whereas *áak-* and *aahkama'p-* claims have the temporal instantiation time of their preadjacent event determined by whatever aspects merges prior to the modal (prospective if no overt aspect merges), *ohkott-*'s agentive/ v_{STIT} semantics requires a perfective containment temporal orientation. I maintain that proposal here. The claim that imperfective ability attributions can make future claims only is an observation that the construction allows *ohkott-*'s preadjacent/event time to follow the utterance time, t_0 - this is due to the imperfective shifting/expanding *ohkott-*'s temporal perspective time into the future, however, as opposed to the presence of a prospective aspect.

204. Note that the ability attribution embedded under the imperfective still encodes a perfective temporal orientation, as outlined in the previous footnote. However, because the imperfective locates the temporal interval associated with its preadjacent (here, the ability attribution) in a future-extended super-interval, the temporal perspective time of the ability attribution is shifted to being a future-extended super-interval. This allows for the ability attribution's preadjacent event to be (perfectively) located in a future interval.

(449) **Context:** My uncle is good at drawing portraits, and had the opportunity to draw my mom's portrait, but decided not to.

- a. *#iikhkottsinaɣ* *anni* *niksisst*
 Ø-ii-ohkott-sina-yii ann-yi n-iksisst
 PFV-ic-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He was able to draw my mother.'
- b. # *áóhkottsinaɣ* *anni* *niksisst*
 á-ohkott-sina-yii ann-yi n-iksisst
 IMPF-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He can draw my mother.'
- c. *áakohkottsinaɣ* *anni* *niksisst*
 áak-ohkott-sina-yii ann-yi n-iksisst
 FUT-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He could have draw my mother.'

(450) **Context:** The last portrait my uncle drew was of my mom. Now he has the opportunity to draw her a new portrait.

- a. *iikhkottsinaɣ* *anni* *niksisst*
 Ø-ii-ohkott-sina-yii ann-yi n-iksisst
 PFV-ic-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He was able to draw my mother.'
- b. # *áóhkottsinaɣ* *anni* *niksisst*
 á-ohkott-sina-yii ann-yi n-iksisst
 IMPF-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He can draw my mother.'
 (Felicitous if the drawing event is imminent - e.g., she's sitting for him, and he's already made marks on the paper.)
- c. *áakohkottsinaɣ* *anni* *niksisst*
 áak-ohkott-sina-yii ann-yi n-iksisst
 FUT-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He can draw my mother.'
 (Preferred if the context is not specified with respect to whether the drawing event is imminent).

(451) **Context:** The last portrait my uncle drew was of my mother. But how he has arthritis, and his hands shake too badly to draw.

- a. *iihkottsinay* *anni* *niksisst*
 Ø-ii-ohkott-sina-yii ann-yi n-iksisst
 PFV-ic-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He was able to draw my mother.'
- b. # *áohkottsinay* *anni* *niksisst*
 á-ohkott-sina-yii ann-yi n-iksisst
 IMPF-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He can draw my mother.'
- c. # *áakohkottsinay* *anni* *niksisst*
 áak-ohkott-sina-yii ann-yi n-iksisst
 FUT-ABLE-draw.VTA-3:3' DEM-3' 1-mother
 'He can draw my mother.'

The data generalisations (context-utterance judgements) for Blackfoot ability attributions can be summarized in terms of the contexts (context A, B and C), and table below:

Context A: My uncle is good at drawing portraits, and had the opportunity to draw my mom's portrait, but decided not to.
Past Event: Possible, but not instantiated in w_0 .
Future Event: Possible (instantiation unsettled)

Context B: The last portrait my uncle drew was of my mom. Now he has the opportunity to draw her a new portrait.
Past Event: Possible and Necessary (Instantiated)
Future Event: Possible (instantiation unsettled)

Context C: The last portrait my uncle drew was of my mother. But how he has arthritis, and his hands shake too badly to draw.
Past Event: Possible and Necessary (Instantiated)
Future Event: Not possible.

Ability Attributions: Felicity Generalisations			
	PFV-ohkott-P	IMPF-ohkott-P	FUT-ohkott-P
Context A	×	×	✓
Context B	✓	✓	✓
Context C	✓	×	×

Given the proposed distinction between actuality entailments and required verifying instances, the *ohkott*-centered generalisations to account for can be described as follows:

1. Perfective *ohkott*- attributions are associated with an actuality entailment - i.e., the entailment that their prejacent event holds in w_0 .
2. Imperfective *ohkott*- attributions require a previous verifying instance of the prejacent event in order to be felicitously asserted, but do not entail the occurrence of their prejacent event in w_0 (i.e., lack actuality entailments).
3. Future *áak- ohkott*- attributions lack both the requirement for (i) the prejacent event to hold true in w_0 , and for (ii) a previous verifying instance.

7.1.3 Moore's Paradox and Blackfoot Epistemic *aahk*-

Before moving on to the analyses for AEs and verifying instances (VIs), I will briefly introduce Copley (2006)'s notion of Efficacy, which will play an important role in my analysis of AEs. Copley (2006)'s main goal is to account for the apparent distinction in strength between English *must* and *should*, as illustrated by the pair in (452).

- (452) a. The beer **must** be cold now; # in fact, it **should** be.
 b. The beer **should** be cold now; in fact, it **must** be.

A traditional approach to this difference in strength (e.g., as in Horn (1989)) is one in terms of force: *should* is weaker than *must* because *should* has a weaker quantificational force. Thus if *must* has a denotation like (453), then *should* should have a denotation like (454). The two differ in that *must* p claims that *all* of the most plausible worlds are p-worlds, while *should* p only claims that *most* of the most plausible worlds are p-worlds.

- (453) Copley (2006)'s Analysis for *must* (Copley, 2006, pp. 3-4)
- i. $C := \langle x_C, t_C, w_C \rangle$
 (where x_C = speaker, t_C = time of utterance, w_C = world of utterance)
 - ii. ϵ_C is the epistemically accessible set of worlds: the worlds that for all the speaker knows could be the actual world
 - a. $\llbracket must \rrbracket^{h,c}(C)(p) := 1$ iff **All(highest-plausibility $_C(\epsilon_C)$)(p)**
 - b. **All**: $= \lambda p \lambda q. p \cap q = p$

- (454) Copley (2006)'s Analysis for *must* (Copley, 2006, pp. 3-4)
- a. $\llbracket should \rrbracket^{h,c}(C)(p) := 1$ iff **Most(highest-plausibility $_C(\epsilon_C)$)(p)**
 - b. **Most** := $\lambda p \lambda q. |p \cap q| > |p - q|$

Copley points out, however, that this traditional view cannot account for contrasts like the following:

- (455) a. # The beer must be cold now, but I have no idea whether it is.
 b. The beer should be cold by now, but I have no idea whether it is.
- (456) a. # The beer must be cold by now, but it isn't.
 b. The beer should be cold by now, but it isn't.

The generalisation is that whereas *should* p can be followed by confessions of ignorance, or falsity, with respect to p's truth, *must* p sentences cannot. This is surprising, under the traditional approach to the difference in strength between *must* and *should*. The infelicity of (456a) is traditionally described in terms of Moore's Paradox, where Moore's Paradox refers to the absurdity of a statement like "It's raining right now, but I don't believe that it's raining right now." The question underlying the "paradox" is why this sort of statement is absurd, under a Hintikka (1975) approach to propositional attitudes like *believe*. If a *believe* claim like "I don't believe that it's raining" only makes a claim about the worlds compatible with the agent's beliefs, why would it be incompatible with a contrary claim about the actual world like "It's raining right now"? There is no necessary reason to assume that the actual world is one of the agent's belief-worlds. The intuition, however, is that a speaker believes that their beliefs have merit - i.e., that their beliefs are a good representation of the actual world. The absurdity of examples like (456a) can be explained with the same intuition - if we assume that a *must* claim like "The beer must be cold now" is a claim about the worlds compatible with the speaker's evidence/knowledge, why would such a claim be incompatible with a contrary claim about the actual world like "it (the beer) isn't (cold)"? Again, there is no necessary reason to assume that the actual world is one of the worlds compatible with the speaker's evidence/knowledge. However, barring strange contexts where a speaker cannot trust their own evidence, the interlocutors can make the assumption that the worlds compatible with their evidence are good candidates for being the actual world. The same sort of reasoning should hold for (456b), however; assuming that *all* of the most plausible epistemically-accessible worlds are good candidates for the actual world, *most* of the most plausible epistemically-accessible worlds should also be good candidates for the actual world. Copley (2006) concludes that the traditional approach towards the difference in strength between *must* and *should* is problematic.

I propose that *must*'s behaviour is exactly the sort of behaviour we expect if *must* is associated with an actuality entailment; if a *must*-p claim commits the speaker to the truth of its prejacent, we would expect that a *must*-p claim could not be followed by a confession of ignorance or falsity with respect to p. I discuss the felicity of the *should* claim in section 7.4.2.

Another observation that Copley (2006) points out, originally made by Leech (1971), concerns the example in (457).

(457) a. Our guests must be home by now.

(I conclude that they are, in that they left half-an-hour ago, have a fast car, and only live a few miles away.)

b. Our guests should be home by now.

(I conclude that they are, in that..., but whether my conclusion is right or not I don't know - it's possible they had a breakdown for instance.)

The observation is that in uttering (457b), the speaker doesn't doubt the logic of their conclusion from the premises, all else being equal. Rather, the speaker doubts that "all else" is really equal. If "all else" is not equal, then the actual world may or may not be one where the conclusion holds true. This contrasts with a case where the speaker knows that "all else" is equal, in which case the speaker would also know that the actual world is a world where the conclusion holds true. From this, Copley concludes that while *should* allows the speaker to doubt whether or not *p* holds in w_0 (i.e., the speaker can doubt that "all else" is equal), *must* does not. Observing that uses of *must* are incompatible with contexts where the speaker knows whether or not *p* holds in w_0 , Copley (2006) suggests that *must* is associated with a presupposition that w_0 must be one of the worlds in *must*'s domain of quantification. The term that Copley (2006) coins for this distinction - i.e., whether w_0 is presupposed to be one of the worlds in the domain of quantification or not - is Efficacy.

While the uses of English epistemic *must* have (to my knowledge) never been categorized as actuality entailments, it is interesting to note that the sort of judgements associated with Moore's Paradox are the same as the sort of judgements used to diagnose actuality entailments: the modal claim cannot be followed by an assertion of ignorance or falsity with respect to the modal's prejacent claim (or uttered in a context where it is made clear that the speaker is ignorant with respect to, or believes in the falsity of, the modal's prejacent). Of interest for our purposes is that strong uses of Blackfoot's epistemic modal *aahk-* are similarly subject to Moore's Paradox.²⁰⁵ This can be observed in (458); strong *aahk-* claims cannot be followed by claims of ignorance regarding the truth of its prejacent:

(458) **Context:** I'm staying in a dorm, and the room above me seems to be blasting loud music and I hear thumping noises in tune to the beat. This seems strange, because the guy who lives above me seems very quiet and studious. But still, I figure he must be dancing - nothing else results in such on-beat thumping noises:

205. Recall from the discussion in chapter 2 that *aahk-* in its matrix uses sometimes appear to be weak. An example of *aahk-* where it is translated with the weak *maybe* was provided in (413) in chapter 6 ("Maybe he was gonna make a cake"). Embedded uses of *aahk-*, which I do not discuss in this dissertation at all, are a question for further research. In embedded contexts, it is not clear whether the form *aahk-* is used as a modal at all, or even whether it is the same morpheme. Here I am only discussing the form *aahk-* where it appears in a matrix clause with a strong epistemic context.

- a. *aahkáiłhiyi*
aahk-á-ihpiyi-wa
EPIST-IMPF-dance.VAI-3
 ‘He must be dancing.’
- b. # *aahkáiłhiyi*, *ki* *nimáátssksini’pa* *kamáłhiyisi*
aahk-á-ihpiyi-wa **ki** **ni-máát-ssksini-’p-wa** **kam-á-ihpiyi-si**
EPIST-IMPF-dance.VAI-3 **conj** **1-NEG-KNOW.VTI-LOC:0-3** **if-impf-dance.VAI-SBJ:3**
 ‘# He must be dancing, but I don’t know if he’s dancing.’

Having observed no distinguishing empirical characteristics, I propose that the behaviour of English *must* and strong epistemic uses of Blackfoot *aahk-* can be subsumed as the same sort of phenomenon observed in the previous section - i.e., I suggest that English *must* and strong epistemic uses of Blackfoot *aahk-* are subject to (full) actuality entailments.²⁰⁶ The analysis of Blackfoot actuality entailments should thus also be able to account for the data in (458).

A final thing to note before moving on to the analysis is that Copley (2006)’s notion of Efficacy can be formalized in different ways. Copley (2006) observes that the difference between *must* and *should* in terms of whether they assume “all else is equal” can be formally framed in terms of *must* requiring that w_0 is in the worlds highest ranked by an ordering source (she calls refers to this as **highest-plausibility**_C(ϵ_C), where ϵ_C is the current epistemic state). The modal *should*, on the other hand, only requires that w_0 is possibly one of the worlds in **highest-plausibility**_C(ϵ_C). In order to formalize this, she proposes the existence of a set of worlds, ϵ , which represents an epistemic state more informed than ϵ_C , the current epistemic state. While *must* presupposes ϵ to be a subset of **highest-plausibility**_C(ϵ_C), *should* only presupposes that ϵ and **highest-plausibility**_C(ϵ_C) have a non-empty intersection: this allows w_0 to be in some subset of ϵ that doesn’t intersect with **highest-plausibility**_C(ϵ_C), allowing the speaker to be ignorant as to the truth of whether the prejacent holds in w_0 .

- (459) Copley (2006)’s Analysis of *must* (Copley, 2006, pp. 10)
 For all C, p: $\llbracket must \rrbracket^{h,c}(C)(p)$
 a. ASSERTS: **highest-plausibility**_C(ϵ_C) \subseteq p

206. See also von Fintel & Gillies (2010), who argue that English *must* claims are just as strong as English non-modal claims. von Fintel & Gillies (2010) point out that if *must* universally quantifies over worlds compatible with the speaker’s knowledge, where knowledge must be true, then a *must* ϕ claim logically entails ϕ . They argue that this is correct. The intuition that a *must* ϕ claim is weaker than a ϕ claim is due to the fact that *must* signals that ϕ is a conclusion derived via indirect inference - i.e., *must* signals that the truth of ϕ is concluded not based on direct observation of ϕ but rather on indirect evidence from which we can deduce ϕ . Their claim that a *must* ϕ claim logically entails ϕ , however, assumes a framework for modality that does not involve ordering sources. Recall from chapter 3 that ordering sources reduce a modal’s domain of quantification so that we are only considering worlds that follow the normal course of events. Ordering sources thus allow the actual world, w_0 , to be a world that does not follow the normal course of events, allowing w_0 to be a world where the prejacent ϕ does not hold true. I differ from von Fintel & Gillies (2010) in assuming that reference to ordering sources is a crucial part of a modal’s denotation. This means that I require something like Copley (2006)’s notion of Efficacy in order to maintain a strong analysis for *must* (and *must*-like) modals.

- b. PRESUPPOSES: $\forall \epsilon$ more informative than ϵ_C :
 $\epsilon \subseteq \mathbf{highest-plausibility}_C(\epsilon_C)$

(460) Copley (2006)'s Analysis of *should* (Copley, 2006, pp. 10)

For all C , p : $\llbracket \textit{should} \rrbracket^{h,c}(C)(p)$

- a. ASSERTS: $\mathbf{highest-plausibility}_C(\epsilon_C) \subseteq p$
 b. PRESUPPOSES: $\forall \epsilon$ more informative than ϵ_C :
 $\epsilon \cap \mathbf{highest-plausibility}_C(\epsilon_C) \neq \emptyset$

This particular formalization, however, is not the only way of encoding Copley (2006)'s core intuition behind Efficacy. In what follows, I will adopt a formalization of Efficacy in terms of a temporally-constrained similarity/identity requirement between w_0 and the worlds in the modal's domain of quantification (i.e., Copley (2006)'s $\mathbf{highest-plausibility}_C(\epsilon_C)$). The requirement that w_0 be in the modal's domain of quantification and the requirement that w_0 be identical to a world in the modal's domain of quantification have the same effect, but while the latter formalization in terms of an identity requirement is easy to constrain temporally, the former formalization in terms of set-membership is not. This ends up being crucial for the analysis I propose.

7.2 Efficacy-Derived Actuality Entailments

In this section I provide an overview for the analysis I propose for actuality entailments, which relies on (i) a particular formalization of Copley (2006)'s notion of Efficacy, (ii) universal quantification over worlds and (iii) the temporal orientation of the modal elements involved. The gist of my proposal is as follows: Efficacy is a requirement on similarity between (i) the world of evaluation (w_0 in unembedded contexts), and (ii) a world in the modal's domain of quantification. The degree of similarity required is such that any event asserted to take place in the modal world must also take place in the world of evaluation - i.e., the degree of similarity is effectively identity. As in Kratzer (2011)'s account, the key part of the analysis lies in the similarity/identity requirement only holding for a particular time: the modal's temporal perspective time. Accounting for the presence/absence of actuality entailments thus relies on the temporal orientation of the modal claim: a full actuality entailment arises when the pre-jacent event's instantiation time is fully contained within the modal's temporal perspective time. If the pre-jacent event's instantiation time is fully excluded from the modal's temporal perspective time (e.g., via prospective aspect), then no actuality entailment arises. On the same note, if the pre-jacent event's instantiation time (or the multiple events satisfying the pre-jacent's predicate, in the case of the habitual reading of the imperfective) only partially overlaps with the modal's temporal perspective time, then only a partial actuality entailment should arise. I test this prediction in the following section.

In what follows I go through a more detailed formalization of the proposal, and run through how the analysis can account for the presence/absence of the observed actuality entailments in Blackfoot.²⁰⁷

7.2.1 Efficacy: An Identity-Requirement on Worlds

I find Copley's intuitions regarding the difference between *must* and *should* compelling, and will adapt her notion of Efficacy. One modification I suggest is that the presence or absence of an Efficacy presupposition is temporally constrained. I will also treat Efficacy as a simple (temporally-constrained) identity condition on worlds, as opposed to adopting Copley (2006)'s formalization in terms of distinct set relations between different epistemic states. Note that for my purposes, identity and identity are not the same sort of relations. Identity can hold between distinct individuals while identity cannot. Thus two clones, Rei II and Rei III, may be identical to each other and thus stand in the identity relation, but they are not the same individual and do not stand in the identity relation. My formalization of Efficacy is as follows (I abstract away from the action-dependent/evidence-dependent formalization of the modal's domain of quantification, as it is not relevant for the analysis at hand):

(461) **Efficacy:** $\exists w' [w' \in \text{MAX}_{G(w,t)}(\cap f(w, t))][\text{IDENT}(w, w', t)]$

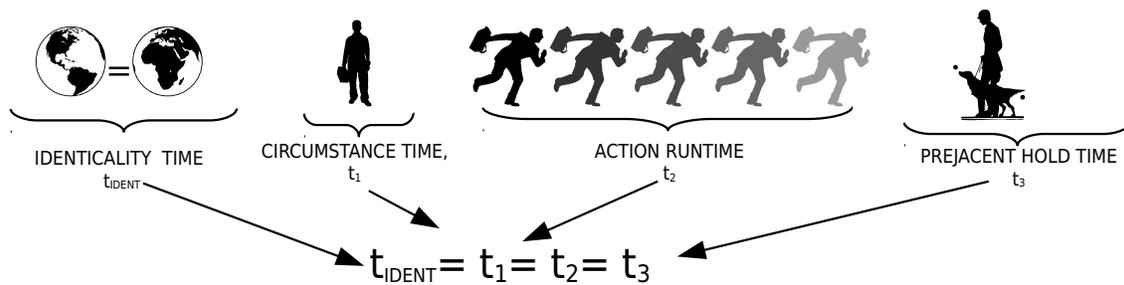
The default assumption that, for any modal expression, the world of evaluation, w , is identical with one of the worlds within the modal's domain of quantification, for the duration of the evaluation time, t .

Note that this formulation of Efficacy is parallel to Kratzer (2011)'s strict counterpart relation in that it (i) requires identity between particulars, and (ii) is constrained in that the identity requirement need only hold during the modal's temporal perspective time. See figure 7.1.

This similarity is not accidental; Efficacy plays the same role in my analysis for deriving actuality entailments. The main differences are that (i) Kratzer (2011)'s counterpart relation holds between individuals, whereas this formalization of Efficacy is a requirement on worlds, and (ii) Kratzer (2011)'s strict counterpart relation is only postulated to hold for circumstantial modals, whereas I suggest that in Blackfoot, Efficacy is the default assumption for modals in general - i.e., both circumstantial and epistemic.²⁰⁸ In section 7.4, I suggest that in English, modals are

207. The presence/absence of the requirement for a verifying instance associated with the ability modal, *ohkott-*, I suggest, is a separate phenomenon from the actuality entailments. In a later section I propose that the requirement for a w_0 verifying instance is a lexically-encoded restriction on *ohkott-*.

208. Except for a brief discussion in chapter 8, I do not address deontic modality, such as the preverbal *sstsina'*- "have to," in this dissertation. Frantz & Russell (1995) actually gloss *sstsina'*- as "have to V before X-ing," although Reis Silva (2009a) identifies this as a deontic/circumstantial modal. My impressions from cursory fieldwork, however, are that it patterns similarly to *ohkott-* in terms of the range of temporal perspectives it allows (i.e., like we saw for *ohkott-* in chapter 4, it only takes a past temporal perspective unless it is first modified with the imperfective or "future" modal *áak-*). I suggest that the goal-oriented nature of *sstsina'*- can derive *sstsina'*'s temporal restrictions. I discuss this further



(Where CIRCUMSTANCE TIME = Temporal Perspective Time)

Figure 7.1: Time Correlation for a BF Circumstantial Claim: Including Identity Condition

morphologically marked according to whether or not they are subject to an Efficacy requirement.

Efficacy is a restriction on modal claims in general, but by itself, it doesn't derive an AE. An AE is derived when two other ingredients are in place: first, the modal must be a universal quantifier over worlds (i.e., be a strong modal), and second, the modal claim must encode a containment temporal orientation - i.e., the runtime of the event must be contained within the temporal perspective time. When all three of these elements coincide (Efficacy, universal-quantification and a containment TO), an AE can be derived via the following reasoning steps:

1. If the modal is universal, the claim is that all of the worlds in the modal's domain of quantification, w' , are worlds where there is some event satisfying the description of the prejacents - i.e., a P-event. This is schematized below, where the horizontal rectangles indicate the runtime of a P-event.

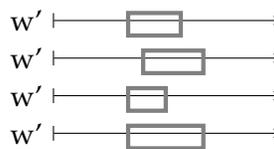


Figure 7.2: Universal Quantification over Worlds

2. If a containment temporal orientation is encoded, then the runtime of the prejacents event is restricted to occurring within the temporal perspective time. This is schematized below. Note that the runtime of the P-events in the w' worlds is more constrained than in the previous diagram: with the restriction encoded by a containment temporal orientation, the runtime of the P-events must be contained within the temporal perspective time, represented with the light grey rectangle.

in chapter 8. In any case, the observations suggest that *sstsina'* takes a perfective temporal orientation, and hence should be subject to an actuality entailments. Further fieldwork is required in order to verify this prediction.

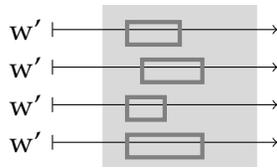


Figure 7.3: Containment/Perfective Temporal Orientation

3. Finally, the Efficacy/Identicality requirement states that one of these worlds must be identical to the evaluation world, for the duration of the temporal perspective time. If we consider an unembedded modal claim, such as the bare perfective ability attribution, the evaluation world correlates with the actual world.
4. This world that is identical to the actual world, as discussed above, has been asserted to have a P-event contained in the temporal perspective time. And because identicality is a symmetric relation, this means the actual world must contain an identical P-event. Otherwise, the identicality requirement would not be satisfied.

This is how an actuality entailment is derived for a perfective ability attribution. All three ingredients are crucial. First, if the modal was an existential, as opposed to universal quantifier over worlds, not all of the worlds in the modal's domain of quantification would be asserted to have P-events. One of these P-less worlds could then be the world required to be identical to the actual world, and no actuality entailment would be derived.

Second, if the modal allowed for a prospective temporal orientation, as schematized below, where the P-events follow the temporal perspective time (again, represented as a grey rectangle), the real-world could look identical to one of the w' worlds for the duration of that time, yet still lack a following P-event. Thus no actuality entailment would be derived. This is illustrated in figure 7.4.

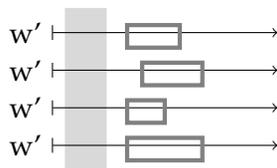


Figure 7.4: Prospective Temporal Orientation

Note that the analysis, as it is, might predict that a perfect temporal orientation (where the runtime of the preadjacent event precedes the temporal perspective time) would similarly avoid an actuality entailment - e.g., the Blackfoot approximation of "he's able to have left" should lack an actuality entailment. This prediction only holds under the controversial assumption that worlds with distinct histories could be considered identical after the divergence in histories, however. I suggest that this is an ontological impossibility. But in any case, I have not been able to elicit an

acceptable example of an ability attribution with a perfect *ikaa-* prejacent. This is not surprising given the analysis of *ohkott-*'s agentivity requirement presented in chapter 4: a perfect *ikaa-* prejacent, like other stative prejacent, fails to temporally satisfy *ohkott-*'s agentivity requirement. In that chapter I argued that Blackfoot's agentive operator v_{stit} involves both a positive and negative condition. The initial and final point of *ohkott-*'s temporal perspective time must differ in terms of whether the temporally-indeterminate prejacent property holds true: at the initial point, the temporally-indeterminate prejacent property cannot be settled as true, but at the final point, it must be settled as true. Because stative predicates don't encode the dynamic change that eventive predicates do (where eventives encode a change over time where P goes from being unsettled, to being settled as true), they cannot satisfy the negative condition.

The third ingredient of the perfective ability construction - the fact that the ability attribution is not embedded under another modal - is also crucial in deriving the actuality entailment: note that the Efficacy/identity requirement only holds between (i) the worlds in the modal's domain of quantification and (ii) the modal evaluation world. In the case of an unembedded ability attribution, the modal evaluation world is the actual world, which derives an AE. But if the ability attribution were embedded under some other element with modal semantics, no AE would be derived. This, I suggest, is why the future *áak-* and imperfective *á-* marked ability attributions do not entail the truth of their complement. Because both elements are modal, the Efficacy/identity requirement places a restriction of identity between a world in *ohkott-*'s domain of quantification and the worlds in *áak-* or *á-*'s domain of quantification, as opposed to the actual world.

A third temporal configuration is possible: if the temporal orientation of the modal is such that the prejacent event's instantiation time overlaps with t (but is not completely contained within t), this means that w must contain part of the prejacent event (the temporal part that overlaps with t). This sort of temporal configuration (figure 7.5) should thus result in a partial actuality entailment.

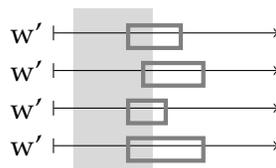


Figure 7.5: Overlapping Temporal Orientation

The three temporal configurations, and their derivation (or lack thereof) of an actuality entailment are summarized below:

(462) Given universal quantification and Efficacy:

1. Containment: If $\tau(e) \subseteq t \rightarrow$ Actuality Entailment
2. Non-Overlapping: If $\tau(e) > t \rightarrow$ No Actuality Entailment

3. Partial Overlap: If $\tau(e) \circ t \rightarrow$ Partial Actuality Entailment

In what follows, I go through the data discussed in the previous section, and show how their independently-motivated temporal orientations map onto their presence/absence of actuality entailments. The generalisations regarding the distribution of AEs with Blackfoot ability attributions are repeated below:

1. Perfective *ohkott*- attributions are associated with an actuality entailment - i.e., the entailment that their prejacent event holds in w_0 .
2. Imperfective *ohkott*- attributions require a previous verifying instance of the prejacent event in order to be felicitously asserted, but do not entail the occurrence of their prejacent event in w_0 (i.e., lack actuality entailments).
3. Future *áak*- *ohkott*- attributions lack both the requirement for (i) the prejacent event to hold true in w_0 , and for (ii) a previous verifying instance.

7.2.2 Perfective Ability Attributions

Perfective ability attributions in Blackfoot are associated with an actuality entailment. In this section, I show that this is exactly what the analysis predicts. Recall that I have proposed a denotation for Blackfoot *ohkott*- as in (463), whereby *ohkott*- universally quantifies over the worlds compatible with (i) an action open to the agent and (ii) the circumstances in w .²⁰⁹

$$(463) \quad \llbracket ohkott- \rrbracket^{h,c} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle} . \lambda t . \lambda x . \lambda w . \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$$

$$(i) \quad \forall w' [\llbracket R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(t, x, w)} \rrbracket \rightarrow P(t, x, w')] \&$$

$$(ii) \quad \exists P' [\forall x, w, t [P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]$$

The denotation proposed also encodes an agentivity requirement on its complement that is only compatible with a perfective containment temporal orientation. This temporal restriction follows from the truth-conditions of the v_{STIT} operator, repeated below in (464) - in order to satisfy the positive condition in (i), the prejacent event must occur prior to the final bound of the temporal perspective time, and in order to satisfy the negative condition in (ii) the prejacent event cannot have taken place prior to the initial bound of the temporal perspective time.²¹⁰ This means that *ohkott*- is only logically compatible with a containment temporal orientation.

209. See chapters 3 and 4 for arguments on why ability should be treated as a universal, as opposed to existential, quantifier over worlds.

210. Recall that the positive condition is the requirement that the truth of P holds at $\text{fin}(t)$, in all of the worlds choice-equivalent to w . In order for this to be true, the prejacent event, which makes P true, must occur prior to $\text{fin}(t)$. The negative condition requires that there is a world in the set of worlds not choice-equivalent to w where P is false. This is only possible if at the time of the choice, $\text{init}(t)$, the event that makes P true has not yet occurred.

(464) $\llbracket v_{\text{stit}} \rrbracket^{\text{h,c}} = \lambda P. \lambda t. \lambda x. \lambda w. \exists a [R(a, x, w, t) \&$

(i) $\forall w' [R(a, x, w', t) \rightarrow P(x, w', \text{fin}(t))] \&$ (Positive Condition)

(ii) $\exists w'' [\neg R(a, x, w'', t) \& \neg P(x, w'', \text{fin}(t))]$ (Negative Condition)

I argued that this required temporal orientation has semantic reflexes in (i) the licensing of causal if-clauses by *ohkott*- (chapter 5) and (ii) the range of temporal perspective times that *ohkott*- can take (chapter 4). Now I propose that with this required temporal orientation (containment), the ability modal's universal quantification over worlds and the Efficacy requirement, we predict that perfective ability attributions in Blackfoot are subject to a full actuality entailment. This is what we saw in section 7.1.2. Efficacy requires that one of the worlds in the modal's domain of quantification is identical to w_0 for the evaluation time, t . Because the evaluation time contains the preajcent's instantiation time as a subinterval, this means that this w_0 -identical world (and hence w_0) must contain an instance of the preajcent event.

7.2.3 Imperfective Ability Attributions

What about imperfective ability attributions? Recall that imperfective ability attributions, while requiring a past verifying instance (which I will address later in this chapter), are not associated with actuality entailments. Rather, the preajcent event has a future/prospective orientation, and need not occur in the actual world. Is this what the analysis predicts?

The denotation I have been assuming for Blackfoot's imperfective is repeated in (465). Recall that the imperfective itself is modal - its preajcent is asserted to hold in all worlds compatible with the circumstances where the agent takes the null action.

(465) Proposal for the Blackfoot Imperfective:

$$\begin{aligned} \llbracket \hat{a}\text{-IMPF} \rrbracket^{\text{h,c}} &= \lambda P. \lambda t. \lambda x. \lambda w. \exists t' [t \subset_{\text{int}} t' \& \forall k \in \mathcal{RP}_t^C \\ &\forall w' [[R(a^0, x, w', t) \& w' \in \cap C(w, t, k)_{\leq G(w,t)}]] \\ &\rightarrow \exists t'' [P(t'')(w') \& t'' \circ k]] \end{aligned}$$

\mathcal{RP}_t^C is the 'regular partition' function: a function which takes an interval (t') and completely partitions it into regular subintervals, k , of a contextually determined length, C .

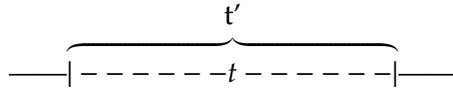
$t \subset_{\text{int}} t'$ indicates that t is a subset of t' , but an *interior* subset - i.e., t does not contain the initial or final bound of t' .

The imperfective, itself containing universal modal semantics, should be subject to an Efficacy requirement - i.e., the evaluation world (w_0 in the unembedded cases we are considering) must be

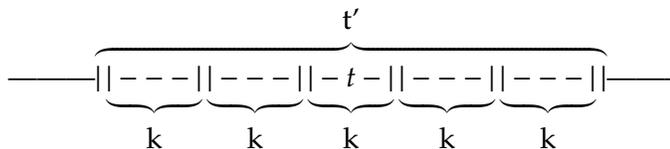
identical to one of the worlds in its domain of quantification for the evaluation time. In the cases we are considering, the evaluation time is the instantaneous present, t_0 . The basic schema for the imperfective temporal orientation is repeated below:

(466) Universally quantifying over a regular partition

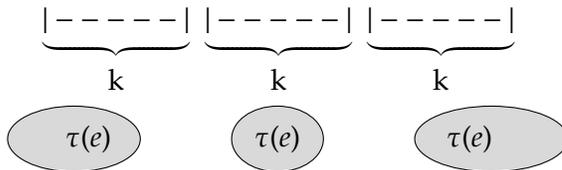
1. Take a superinterval, t' , of the evaluation time, t



2. Regularly partition t' into equal intervals, k .

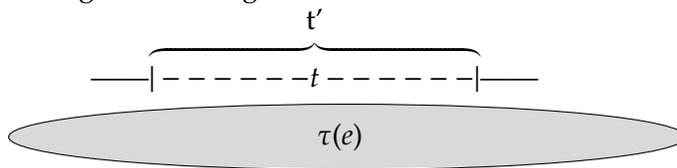


3. Each of these k -intervals overlaps with a P-situation

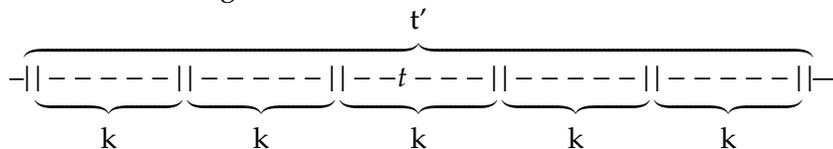


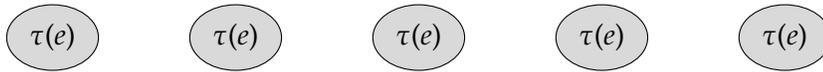
The ability claim is thus asserted to hold true (in the null-action determined worlds) for either (i) an interval that overlaps with (each instant contained within) a superinterval of t_0 (the in-progress reading), or (ii) several intervals that overlap with regular subintervals of a superinterval of t_0 (the habitual reading).

(467) a. In-Progress Reading



b. Habitual Reading





In the progressive case, although the large *ohkott*- interval must contain a P-event in the worlds in the imperfective’s domain of quantification, the actual world only needs to be identical to these worlds up to the imperfective’s temporal perspective time, t_0 . We thus only predict a partially overlapping temporal orientation, and a partial actuality entailment. This is supported by some data: recall the following case of an imperfective ability attribution from chapter 5. The consultant’s comment (“more like she’s in the water”) suggests that the winning-the-swimming-contest event described by the imperfective ability attribution is already in-progress.²¹¹

- (468) **Context:** My siblings and I get along very well, but when it comes to games and contests, we are very competitive with each other. Every time we’re all together somewhere and we see a pool, we have to have a treading-water contest. This time, however, my eldest sister is 7-months pregnant. She still wants to compete, since she is the reigning champion, but we disqualify her, on the grounds that my over-protective mom will have apoplexy. My sister acquiesces, but grumbles:

?# *kamáó'tsiiniki* *nitáóhkottomo'tsaaki*
kam-á-otsi-iniki *nit-á-ohkott-omo'tsaaki*
 if-IMPF-SWIM.VAI-SBJ:1 1-IMPF-ABLE-WIN.VAI

‘If I was swimming, I could win.’

BB: More like she’s in the water, or talking about like in general

An imperfective-marked ability attribution, when the imperfective is interpreted progressively, locates the temporal perspective time of the ability attribution as overlapping with a future-extended superinterval of t_0 . As the ability attribution’s temporal perspective time correlates with the runtime of the action that *ohkott*- quantifies over, which very nearly corresponds to the runtime of the preajacent event, the preajacent event’s runtime is effectively asserted to overlap with a future-extended superinterval of t_0 . This only shifts the end of the preajacent’s runtime into the future. There still must be part of the event ongoing at t_0 . The example in (468) is infelicitous because the context does not describe this sort of situation, as the subject is not part of an ongoing winning-the-swimming-contest event. This is reflected by the consultant’s comment. The conditional antecedent *kamáótsiniki* “if I was swimming” is an attempt by the elicitor to satisfy the requirement for an ongoing event, however this fails because as we observed in chapter 5, progressive readings of the imperfective fail to license conditional antecedents.

211. Note that the Blackfoot *omo'tsaaki* “win” patterns like an accomplishment, not an achievement, according to Blackfoot-internal diagnostics: the imperfective form *nitáómo'tsaaki* can be interpreted as either in-progress “I’m winning” or habitual “I win (a lot),” where recall from chapter 2 that achievements in Blackfoot (like *istohkopi* “fall”) can only have habitual readings with the imperfective. Events described by *omo'tsaaki*- thus include the activity leading up to the transition point, hence the swimming is part of the *omo'tsaaki*- event in (468).

In the generic case, each of the *ohkott*-intervals that overlap with the *k*-intervals must contain a P-event, but none of these P-events needs to overlap at all with the imperfective's temporal perspective time, t_0 . Thus we do not expect any actuality entailment at all, as I have showed in section 7.1.2 (e.g., (443b)).

7.2.4 Future Ability Attributions

As we saw in (449) - (451), Blackfoot ability attributions marked by the future modal *áak-* are similarly devoid of actuality entailments. Additionally, they do not require a previous verifying instance. The relevant context-utterance pairs are provided in (469): (469a) has a present temporal perspective and (469b) has a past temporal perspective.

- (469) a. **Context:** My uncle is good at drawing portraits, and has the opportunity to draw my mom's portrait. He might or might not end up drawing her portrait. (no AE or VI)

áakohkottsina *anni* *niksisst*
áak-ohkott-sina-yii *ann-yi* *n-iksisst*
 FUT-ABLE-draw.VTA-3:3' DEM-3' 1-mother

'He can draw my mother.'

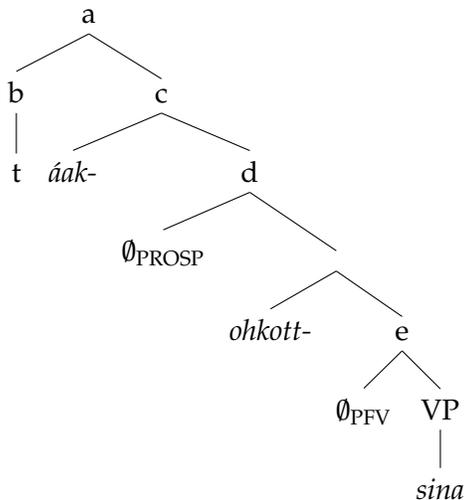
- b. **Context :** My uncle is good at drawing portraits, and had the opportunity to draw my mom's portrait, but decided not to. (no AE or VI)

áakohkottsina *anni* *niksisst*
áak-ohkott-sina-yii *ann-yi* *n-iksisst*
 FUT-ABLE-draw.VTA-3:3' DEM-3' 1-mother

'He could have drawn my mother.'

Is this what the analysis predicts? Under the null assumption that morpheme order reflects merge order, I assume that the Blackfoot sentences in (469) has a structure as follows.

(470)



The ability modal *ohkott-* takes a perfectly interpreted *sinaa* ‘draw/write’ as its complement. This follows from *ohkott-*’s agentivity requirement, as detailed in chapter 4. The resulting ability attribution is embedded under *áak-*, but recall that the future modal *áak-*, when taking an eventive predicate as its prejacent, and being interpreted with respect to a present temporal perspective, is always interpreted with a prospective temporal orientation (chapter 6). The ability attribution, like an eventive predicate, can only hold true of an interval. This means that the ability attribution, like an eventive prejacent, must be interpreted as having first been modified by a null prospective aspect if the *áak- ohkott-* claim combines with a present temporal perspective time like t_0 . This shifts the temporal perspective time of the *ohkott-* claim (as well as the contained ‘drawing’ time) to a point after t_0 . This is disjoint with t_0 , the temporal perspective time of the *áak- ohkott-* claim, hence we predict no actuality entailment, as observed in section 7.1.2 (and (469a)).

If the temporal perspective time is t_{PAST} , the ability attribution can be interpreted as having been modified by either a null perfective or prospective aspect. The option of interpreting the ability attribution with a null prospective aspect similarly allows *áak- ohkott-* claims with a past temporal perspective to avoid an actuality entailment, as observed for (469b).

7.2.5 Consequences and Predictions

In this section, I discuss predictions/consequences of the analysis for non-ability modal claims. I discuss first the strong uses of epistemic *aahk-*, then discuss the imperfective, and the strong future *áak-*. For the reader’s convenience, the key features of the analysis are summarized below:

(471) Key Ingredients for a Blackfoot Actuality Entailment

1. Universal quantification over worlds
2. Overlapping temporal orientation
3. Efficacy/Identity Requirement

As I’ve assumed that Efficacy is a requirement that holds for modals across the board in Blackfoot, In what follows I focus on whether the first two factors converge for non-ability modal constructions.

AEs with Strong Epistemic *aahk-*

What prediction does the analysis make for the strong uses of Blackfoot’s epistemic modal *aahk-*? Recall that in chapter 4 section 4.5.2, I proposed that epistemic modals in Blackfoot are associated with temporal perspective times that correlate with the time interval for which evidence remains relevant. I suggested that unlike previous circumstances, previous evidence does not become

(474) **Context:** I'm staying in a dorm, and the room above me seems to be blasting loud music and I hear thumping noises in tune to the beat. This seems strange, because the guy that lives above me seems very quiet and studious. But still, I figure he must be dancing - nothing else results in such on-beat thumping noises:

- a. *aahkáihpiyi*
aahk-á-ihpiyi-wa
EPIST-IMPF-dance.VAI-3
 'He must be dancing.'
- b. # *aahkáihpiyi*, *ki* *nimáátsskssini'pa* *kamáihpiyisi*
aahk-á-ihpiyi-wa **ki** **ni-máát-ssksini-'p-wa** **kam-á-ihpiyi-si**
EPIST-IMPF-dance.VAI-3 **conj** **1-NEG-know.VTI-LOC:0-3** **if-impf-dance.VAI-SBJ:3**
 '# He must be dancing, but I don't know if he's dancing.'

The proposed analysis can thus account for the behaviour of Blackfoot *aahk-*, in terms of its temporal orientation, and its non-cancellability.

Before continuing, I will make a note of two points related to epistemic modality. First, the temporal perspective time I have proposed for Blackfoot's epistemic modals is based on reasoning that does not, as I have presented it, appear to be Blackfoot specific. One might conclude that if evidence is cumulative, it is cumulative no matter what language one is speaking, and the proposed past-extended temporal perspective time should be a property universal to all epistemic modals. However, I leave open the possibility that languages may differ in terms of what counts as 'evidence.' More specifically, I suggest that different languages can place different restrictions on what sort of propositions are allowed to be included within an evidential modal base. It may be the case that in Blackfoot, only direct sensory information is encoded in an evidential modal base. This is the sort of information that shouldn't be discounted, but rather should be reinterpreted if prior evidence conflicts with newer evidence. Other languages may be less restrictive in terms of the sorts of propositions that are allowed in an evidential modal base. For instance, another language may allow propositions expressing inferences based on direct sensory information into an evidential modal base. This sort of proposition could be discounted if it conflicts with newer evidence. The same sort of reasoning that motivates $\epsilon(t)$ as the temporal perspective time associated with Blackfoot epistemic modals would not hold in such a language. This allows for epistemic modals crosslinguistically to be distinct with respect to the range of temporal perspective times they allow.

Second, recall that Copley (2006)'s original puzzle was to account for the seeming difference in strength between English epistemic *must* and *should*. An obvious question that arises is whether the analysis proposed here is compatible with her original data. I will speculate on this issue in section 7.4, but for now will continue with the discussion of how the proposed analysis for Blackfoot predicts the presence/absence of Blackfoot AEs in various modal/aspectual contexts.

Partial AEs for Bare Imperfectives

The proposed denotation for Blackfoot's imperfective contains universal modal semantics and, for the progressive interpretation, an overlap between the imperfective's temporal perspective time and the instantiation of the prejacent situation. Because the analysis for actuality entailments is not tied up with ability modals per se, we thus expect basic (non-ability) imperfective claims to similarly be subject to actuality entailments. This prediction is borne out by the data. The in-progress use of the imperfective is such that the part of the modal event that overlaps with the evaluation time (t_0 in default cases) is the beginning of the event (recall the diagram below):

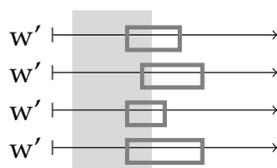


Figure 7.6: Overlapping Temporal Orientation: Episodic

We thus predict that the actual world, w_0 , being identical to one of the modal worlds for the duration of the temporal perspective time, must similarly contain the beginning of (what becomes, in the modal worlds) the prejacent event. And as we saw in chapter 6, Blackfoot's imperfective, in its in-progress use, requires the prejacent event to have begun in w_0 , as shown in (475):

(475) **Context:** My mom is rooting for one particular dancer on a reality dance show, and although she doesn't like to watch the whole show, she always wants to make sure she catches his dances. I see that he's about to start dancing, although he hasn't quite started yet - he's just standing on stage in his initial pose. I yell to my mom:

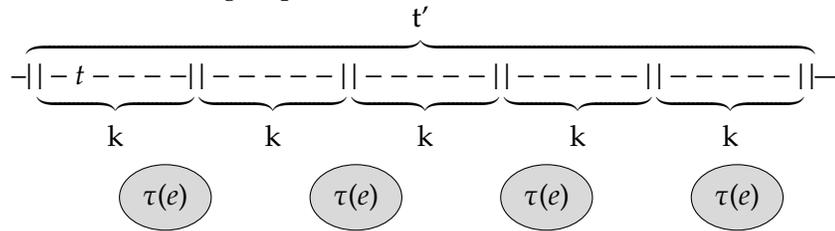
- a. # *naá* *áihpiyi*
 n-a-á á-ihpiyi-wa
 1-mother.VOC IMPF-dance.VAI-3
 Target: 'Mom, he's dancing!'
 BB: Saa, because he's not even dancing.
- b. *naá,* *áakomatapihpiyi*
 n-a-á áak-omatap-ihpiyi-wa
 1-mother.VOC FUT-begin-dance.VAI-3
 'Mom, he's about to start dancing!'

We expect the combination of Efficacy, universal quantification and an overlapping temporal orientation (as directly encoded in the imperfective) to yield a partial actuality entailment. While the actual world need not be a world where he continues dancing (unlike all of the worlds in the modal's domain of quantification), at the imperfective's temporal perspective time, t_0 , w_0 has to be identical to one of these worlds, where a dancing event has already begun in each of these worlds. In order for w_0 to be identical to one of these worlds, it must be the case that a dancing event

has already begun in w_0 , accounting for why the bare imperfective in (475a) is infelicitous in the given context, where no such event has begun. In other words, otherwise non-modal imperfective claims appear subject to a partial actuality entailment, as predicted by the analysis.²¹⁴

What about habitual uses of the imperfective? Consider the diagram below, where the evaluation time, t , is contained within the first partition cell of the superinterval t' . The event that this partition cell overlaps with, however, can follow t .

(476) a. Habitual Reading (k -partition members are non-trivial intervals)



With such a configuration, no event overlaps with the modal evaluation time, t . This predicts that habitual uses of the imperfective are not subject to actuality entailments. This appears to be the case, as shown in (477), an example constructed along the lines of Carlson & Pelletier 1995's "Mary sorts the mail from Antarctica" example.

(477) **Context:** My brother and I are handed a list of chores that we're supposed to divide up between us. When I look carefully at the list though, it looks like the same list of chores that my sisters and I had to divide up when we were kids living in Calgary. So I look for the chores that would have required a lot of work in Calgary, but not in Vancouver. I choose shovelling the driveway when it snows, since it doesn't snow in Vancouver. A few weeks later, my brother realizes the uneven allocation of chores and complains, but I shrug and say:

kamohpotaasi, nisto, nitáí'nokatoo'p omi koonskoo
kam-ohpota-si, n-isto, nit-á-i'nokatoo'-p omi koonskoo-yi
 if-snow.vai-SBJ:3, 1-pro, 1-**IMPF**-shovel.vti-LOC:0 DEM SNOW-0

'When it snows, I shovel the snow.'

BB: It would just mean whatever snow came, you would shovel it.

This example, wherein the imperfective is not systematically associated with an actuality entailment, further shows that the actuality entailments associated with imperfective-marked ability attributions are due to the presence of the ability modal *ohkott-*, as opposed to the presence of the imperfective *á-*.

214. I say 'otherwise non-modal,' because as we saw, the imperfective can further modify modal claims like ability *ohkott-* claims, as well as deontic *sstsina'*- claims.

AEs with the "Future" *áak-*

Recall that the so-called "future" modal *áak-* can have a coincident/overlapping temporal orientation when its prejacent is a stative (or "stativized") predicate. Because *áak-* is uncontroversially a universal quantifier over worlds, we thus predict that such uses of *áak-* are associated with an actuality entailment. This appears to be the case, as these present-oriented uses of *áak-* P are similarly subject to Moore's Paradox, and cannot be followed up with continuations like "but I don't think that P."²¹⁵

- (478) **Context:** My 18 month old niece, Kaia, always cries when her dad says goodbye before he goes to work. From the room I'm sitting in, I can see the driveway, so I can see that her dad is leaving, but I can't see or hear Kaia.

annah *Kaia áakáwaasai'ni* *annahk*
 ann-wa-hka Kaia áak-á-waasai'ni-wa *annahk*
 DEM-3-rel Kaia FUT-IMPF-CRY.VAI-3 now

ki *nimáátoohkaanistsiksimsstahpa* *otáwaasai'nsi*
 ki ni-máát-noohk-aanist-iksimsstaa-hpa ot-á-waasai'ni-hsi
 conj 1-NEG-C.exp-manner-think.VAI-nonaff.loc

'Kaia will be crying right now, # but I don't think she's crying.'

BB: That one's sort of contradicting.

This also appears to be the case for English *will* - such uses of *will* are often referred to as epistemic uses of *will*. This is indicative of their similarity to English *must*.

- (479) He'll be running from the law now (*but I don't think he is).

To summarize, I have proposed that the presence/absence of actuality entailments in Blackfoot, entire or partial, follows from an analysis whereby modal claims are subject to a temporally-constrained requirement of identity between the evaluation world, and at least one world in the modal's domain of quantification (Efficacy, cf. Copley (2006)). This identity requirement only holds for the temporal perspective time. Given this restriction, if a modal (i) universally quantifies over the worlds in its domain of quantification and (ii) has a temporal orientation where the temporal perspective time overlaps with, or contains, the prejacent event's instantiation time, we derive an actuality entailment. Throughout the discussion, I have mostly abstracted away from the presence/absence of the need for a verifying instance (in particular, for the Blackfoot ability attributions). These verifying instances are also aspectually-conditioned (albeit in a different way); I discuss their distribution next.

215. This sort of sequence is acceptable in contexts where I think that my niece is fake-crying. For example, my niece always cries when my mom puts her in a car seat, until my mom gives her a rice puff. I then find out that she never cries when her own mom puts her in the car seat, which suggests that she's not really crying when my mom puts her in the car seat. In a context where I see my mom putting my niece in the car seat (which is back-facing so I can't see my niece's face), I could say something like (478) to mean "Kaia will be crying right now, but I don't think she's *really* crying." (She's just pretending to so that my mom will give her rice puffs.)

7.3 Verifying Instances and Ability in Blackfoot

Davis et al. (2010) made the claim that Blackfoot ability attributions in the imperfective aspect are associated with an actuality entailment; they observed that such claims are incompatible with contexts where the agent in question has never accomplished the feat in w_0 . I have proposed, however, that the real-world events required for a felicitous assertion of an imperfective ability claim (in Blackfoot at least), are distinct from the events encoded by the ability modal's prejacent, and that these events are distinguishable in terms of their temporal relation to the temporal perspective: while the required w_0 event for an imperfective ability claim must precede the imperfective's temporal perspective time, the ability modal's prejacent event (like the ability modal's temporal perspective time) overlaps with a future-extended interval of this time. As these two events have different temporal specifications, they must be encoded or derived by distinct means.

I propose to encode the need for verifying instances as an evidence-based assertability condition. Why an *evidential* assertability condition? Consultant comments regarding the infelicity of imperfective examples like (480b) are frequent, spontaneous, and consistent; the general theme is that one cannot be sure of someone's abilities unless one has directly witnessed the fact, and that one cannot make the claim unless one is very sure. Examples of comments are given below; (481) and (482) are parallel examples and accompanied with similar comments.

(480) **Context A:** There's a genetic disorder where people can't make leptin, and so can't feel full. Two newborn babies have been crying continuously for milk, so we suspect that they might have the disorder. One of the babies gets a blood test which shows that their baby doesn't have that disorder. So we conclude "He CAN get full!"/"He CAN be full!"

- a. # *iikhkottookoyi*
ii-ohkott-ookoyi-wa
ic-ABLE-be.full.VAI-3

'Target: He was able to get full.'

PERFECTIVE

- b. # *áóhkottookoyi*
á-ohkott-ookoyi-wa
IMPF-ABLE-be.full.VAI-3

'Target: He can be full.'

IMPERFECTIVE

BB: Maybe, if he's crying because he has colic, not because he's still hungry. Before you can say this, you know for sure that baby can be full.

(481) **Context:** My friend Abigail is very fit and has hiked a lot. I know she's hiked mountains much more difficult than the Chief (a hiking trail up a mountain in Squamish), so doing the Chief will be no problem for her.

- a. # *ííhkottaamisáátomayi* *omi* *mistaaki*
 ii-ohkott-waamisaatoo-m-ayi om-yi miistaaki
 ic-ABLE-ascend.VTI-3:0-DTP DEM-0 mountain-0
 ‘She was able to climb that mountain.’
- b. # *áóhkottaamisáátomayi* *omi* *mistaaki*
 á-ohkott-waamisaatoo-m-ayi om-yi miistaaki
 IMPF-ABLE-ascend.VTI-3:0-DTP DEM-0 mountain-0
 ‘She is able to climb that mountain.’
- c. *áakohkottaamisáátomayi* *omi* *mistaaki*
 áak-ohkott-waamisaatoo-m-ayi om-yi miistaaki
 FUT-ABLE-ascend.VTI-3:0-DTP DEM-0 mountain-0
 ‘She can climb that mountain.’/‘She will be able to climb that mountain.’
BB: She has to have climbed it before - we have to be sure. For both *ííhkottaamisáátomayi* and *áóhkottaamisáátomayi*, you have to have climbed it before. Like you see it with your own eyes, then you know she can do it.

(482) **Context:** There’s this secret family of werewolves, where the ability to turn into a wolf at the full moon is genetically passed down. A baby was just born to this family. Can I say: This baby can become a wolf.

- a. # *amo issitsimaan áóhkottaanista’psiiwa’si* *maokoyii*
 amo issitsimaan á-ohkott-aanist-a’psii-wa’si maokoyii
 DEM baby IMPF-ABLE-manner-bism-turn.into.VAI wolf
 ‘This baby can change into a wolf.’
BB: Because it’s just a baby and it hasn’t turned into a wolf yet.
- b. *amo issitsimaan áakohkottaanista’psiiwa’si* *maokoyii*
 amo issitsimaan áak-ohkott-aanist-a’psii-wa’si maokoyii
 DEM baby FUT-ABLE-manner-bism-turn.into.VAI wolf
 ‘This baby can change into a wolf.’

An *ohkott-* claim thus seems to require knowledge of a verifying instance of the sort of event described by its complement in order to be felicitously asserted. How can such an evidence-based assertability condition be formalized? Recall the analysis that I proposed for Blackfoot’s epistemic modal *aahk-* “must.” I suggested that *aahk-*’s domain of quantification was restricted by evidential and doxastic modal bases, \mathcal{E} and \mathcal{D} respectively.²¹⁶ I also suggested that the epistemic *aahk-* was subject to a unique temporal perspective time: a past-unbounded interval right-demarked by the utterance time. I suggest that this sort of temporal stretch is the standard sort of evaluation interval associated with evidence in Blackfoot; this reflects the intuition that the nature of evidence is cumulative. Previous evidence (unlike previous circumstances, or previous goals) should not be discounted when one makes an evidence-based claim. Even when a rational agent is confronted

216. Although English *must* can be used deontically, with a prospective temporal orientation, this is not the case for Blackfoot *aahk*, which cannot be used deontically or with a prospective temporal orientation.

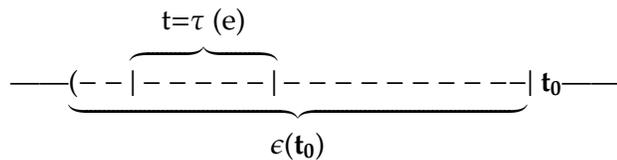
with the possibility that they have been led astray by misleading evidence, the rational agent should not disregard the aforementioned evidence, but rather reinterpret it.

I thus propose that *ohkott*'s evidence-based requirement (the requirement for a verifying instance) is associated with a past-unbounded right-bounded interval, where the right-bound of the interval is (inclusively) *ohkott*'s temporal perspective time. This leaves three options for the temporal location of the verifying instance. Option one: the verifying instance is contained within *ohkott*'s temporal perspective time. Option two: the verifying instance completely precedes *ohkott*'s temporal perspective time. Option three: the verifying instance partially overlaps with the beginning of *ohkott*'s temporal perspective time (the beginning of the verifying instance preceding *ohkott*'s temporal perspective time.) In all cases, the verifying instance must precede the final bound of *ohkott*'s temporal perspective time. Below I formalize the uniformity of evidence-based temporal perspective times with a function, ϵ that takes a time argument, t , and yields the relevant interval for which one must consider the evidence - i.e., an interval right-bounded by t , and unbounded leftward. Any evidence-based semantic requirement, such as the modal claim made by epistemic modals like *aahk*-, or the evidence-based presupposition required by *ohkott*-, makes use of ϵ in order to demarcate the interval for which the evidential requirement must hold true.

(483) Evidence-Based Temporal Perspectives

\mathcal{E} and \mathcal{D} represent evidential and doxastic modal bases respectively. Let ϵ be the function which takes a time, t , and yields the past-extended (left-unbounded) interval inclusively right-bounded by t .

1. $\llbracket aahk- \rrbracket^{h,c} = \lambda P_{\langle i, \langle s, t \rangle \rangle} . \lambda t . \lambda w . \forall h \in \mathcal{E}(Sp(c), w, \epsilon(t))$
 $\forall w' [\llbracket R(h, x, w', \epsilon(t)) \& w' \in \cap \mathcal{D}(x, w, \epsilon(t)) \leq G(w, \epsilon(t)) \rrbracket \rightarrow P(x, w', \epsilon(t))]$



2. Ability *ohkott*'s Evidence-Based Requirement:
 $[\lambda P . \lambda t . \lambda x . \lambda w . \exists t' [P(t', x, w) \& t' \subseteq \epsilon(t)]] \in \mathcal{E}(Sp(c), w, t)$

An *ohkott*-P claim thus requires that there is a proposition of the form in (484), interpreted with respect to the same (i) temporally-indeterminate preajcent property, (ii) individual and (iii) temporal arguments that the *ohkott*- claim takes.

(484) $\lambda t . \lambda x . \lambda w . \exists t' [P(t', x, w) \& t' \subseteq \epsilon(t)]$

This proposition must be a member of the set of propositions available to the Speaker in c , as evidence, at time t in world w . That is, an *ohkott*-P claim requires that a P-event (by the agent, x) either precedes, or is contained within, *ohkott*'-s temporal perspective time. This evidence-based presupposition is encoded in *ohkott*'-s lexical entry, in addition to the action-dependent modal claim that there is an action available to the agent whereby in all of the circumstantially-accessible worlds where the agent takes that action (highest ranked by an ordering source, G), the agent sees to it that a P-event occurs. A description of the proposed truth and felicity conditions for *ohkott*- is given in (485).

(485) Truth and Felicity Conditions for *ohkott*-

1. Truth-Conditions:

$$\llbracket \textit{ohkott} - \rrbracket^{\text{h.c}} = \lambda P_{\langle i, \langle e, \langle s, t \rangle \rangle \rangle}. \lambda t. \lambda x. \lambda w. \exists a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)}$$

$$(i) \forall w' [\llbracket R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(t, x, w)} \rrbracket \rightarrow P(t, x, w')] \&$$

$$(ii) \exists P' [\forall x, w, t [P(t, x, w) \rightarrow v_{\text{stit}}(P', t, x, w)]]$$

2. Evidence-based Felicity Condition:

$$[\lambda P. \lambda t. \lambda x. \lambda w. \exists t' [P(t', x, w) \& t' \subseteq \epsilon(t)]] \in E(\textit{Sp}(c), w, t)$$

Note that I have been referring to the requirement for a verifying instance (VI) as an assertability condition, as opposed to encoding it as part of *ohkott*'-s truth-conditions, or encoding it as a presupposition. I have not encoded the VI-requirement as a presupposition because the VI-requirement does not hold for negated *ohkott*- claims. This suggests that the VI-requirement does not project (in the sense of Heim (1983), Simons et al. (2010), a.o.), and hence is not a presupposition (nor a Potts (2003)-style conventional implicature). Another possible formalization is one where the VI-requirement is a presupposition, but instead of a presupposition that requires that the speaker have evidence that a P-event obtains within $\epsilon(t)$, it only requires that the speaker have evidence regarding *whether* a P-event is contained within $\epsilon(t)$. That is, the felicity condition could be formalized as a conjunctive requirement as follows:

$$(486) \exists t' [\llbracket P(t', x, w) \& t' \subseteq \epsilon(t) \rrbracket \in E(\textit{Sp}(c), w, t) \vee \neg \llbracket P(t', x, w) \& t' \subseteq \epsilon(t) \rrbracket \in E(\textit{Sp}(c), w, t)]$$

This would avoid the problem raised by the lack of a required verifying instance for negated ability attributions; evidence for the lack of a P-event can satisfy the above presupposition. However, this formalization is also problematic. As far as I can tell, such a formalization also predicts that negative evidence regarding a P-event's occurrence in $\epsilon(t)$ could satisfy a positive ability attribution's VI-requirement, nullifying the requirement for a verifying instance in general.²¹⁷ It also seems incorrect to analyze the VI-requirement as a conjoined clause to *ohkott*'-s truth-conditions.

217. Thanks to Ashwini Deo for pointing out this possible formalization.

The intuition is that knowledge of a verifying instance is necessary in order for a speaker to reasonably conclude that the agent truly has the ability to carry out an event of the type described by the prejacent. This sort of requirement doesn't have the same status as the currently proposed truth-conditions. If the VI-requirement were treated as a conjoined clause on *ohkott*'s truth-conditions, we would have no way of accounting for its different status. For this reason, I have not treated the VI-requirement as either a presupposition, or a second clause on *ohkott*'s truth-conditions. How assertability conditions can be implemented into the formal semantic system I adopt is an important issue I leave for further research.

The key to solving the data puzzle with the truth and assertability conditions in (485) lies in the lexical specification of *ohkott*'s temporal perspective time, *t*, as the right-bound of the time interval in which the VI must be contained. Because I have equated these two times, we predict that any element that temporally operates on *ohkott*'s temporal perspective time will also temporally shift the right-bound of the temporal interval in which the verifying instance must be contained. This means that the addition of a modal or aspectual element that licenses a prospective temporal orientation (like *áak*-), can use a null prospective aspect to shift the temporal perspective time of an embedded *ohkott*- claim into the future. And by doing this, the null prospective aspect will also shift the right-bound of *ohkott*'s evidence-based requirement into the future. Since the verifying instance can be contained within *ohkott*'s temporal perspective time (recall option one above), the verifying instance can thus be located entirely in the future. This is how the presence/absence of required *w*₀ verifying instances can be affected by higher temporal operators. In what follows I go through the proposed analysis, in the relevant modal/aspectual contexts, and show how we derive the observed data. The data generalisations I aim to account for are summarized in table 7.1.

<i>ohkott</i> -claims	<i>w</i> ₀ VI required?	AE?
∅ _{PFV} - <i>ohkott</i> -P	N/A (AE suffices)	Y
<i>áak</i> -FUT <i>ohkott</i> -P	N	N
<i>aahkama</i> ' <i>p</i> - _{might} <i>ohkott</i> -P	N	N
<i>á</i> -IMPF <i>ohkott</i> -P	Y	N

Table 7.1: Verifying Instances and Forms of *ohkott*-

7.3.1 VIs and Perfective Ability Attributions

First we can consider a perfective ability attribution, which we saw behaves much like the data provided by Bhatt (2006) and Hacquard (2006); perfective ability attributions in Blackfoot are associated with an actuality entailment, whereby the modal claim is acceptable only if the prejacent event occurred in the actual world. They do not require, however, a separate preceding verifying instance: achievement of the prejacent event appears to be sufficient evidence to make the modal claim. This is unsurprising given the proposed evidential assertability condition, which allows a P-event to either precede or (crucially) be contained within the temporal perspective time. The

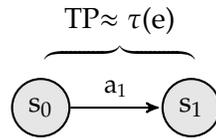
actuality entailment (i.e., the realization of the prejacent event during the temporal perspective time) is sufficient to fulfil this requirement, as it is an instance of a P-event within *ohkott*-’s temporal perspective time.

7.3.2 VIs and Modally-Modified Ability Attributions

What does the analysis predict about the presence or absence of a required verifying instance when *ohkott*- is embedded under a modal element (i.e., *áak*- “will”, or *aahkama’p*- “might”)? The data generalisations are that while *ohkott*- embedded under the imperfective requires a past w_0 verifying instance, *ohkott*- embedded under *áak*- and *aahkama’p*- does not require a verifying instance. Is that what we predict?

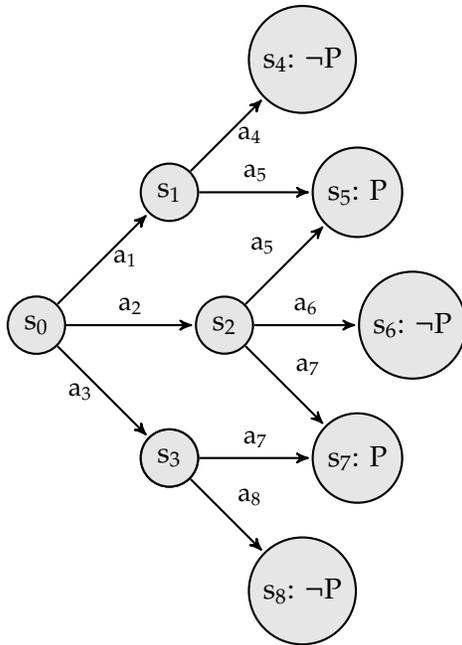
Recall first that I’ve argued that *ohkott*- claims are eventive, in that they have a λt variable which is necessarily a non-trivial interval, as it corresponds to the run-time of the (non-null) action that *ohkott*- quantifies over. This is schematized in (487), where the arrow representing the action that *ohkott*- quantifies over correlates with a non-trivial interval and *ohkott*-’s temporal perspective time (TP).

(487) Temporal Perspective in Blackfoot $\approx \tau(e)$, where e is an instantiation of the action \mathbf{a}_1



I’ve also shown that “future” *áak*- and “might” *aahkama’p*- claims, when they take an eventive prejacent, yield a prospective interpretation. In the framework provided here, *áak*- and *aahkama’p*- interpret eventive prejacent, like *ohkott*- claims, as being modified by a null prospective aspect. This means that *áak-ohkott*- (and *aahkama’p-ohkott*-) claims shift *ohkott*-’s temporal perspective time (i.e., the run-time of the action) prospectively from the temporal perspective time associated with *áak*-/ *aahkama’p*-. In the cases we are considering, where we lack an overt past temporal adverbial or conditional antecedent, the temporal perspective time is the utterance time t_0 . This means that the right-bound of the temporal interval during which the verifying instance is required to have occurred, is also shifted into the future. We thus expect, as observed, that an *áak*-/ *aahkama’p*-modified *ohkott*-claim does not require a past verifying instance. This is schematized by the diagram in (488), where the arrows from s_0 to s_1 - s_3 represent quantification over actions encoded by *áak*-/ *aahkama’p*-, and the arrows from s_1 - s_3 to s_4 - s_8 represent the quantification over actions introduced by the embedded *ohkott*-.

(488) *áak-ohkott*-P is true:

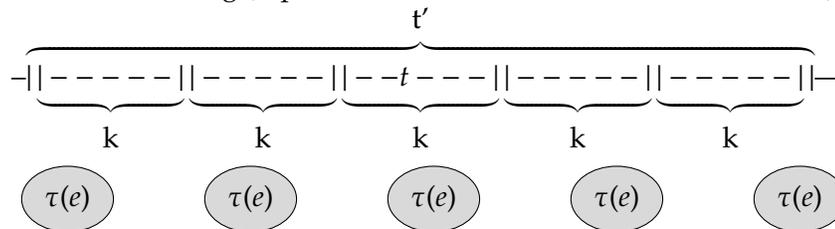


All actions available to the agent from s_0 (i.e., a_1, a_2, a_3) are such that all of the worlds compatible with these actions and the circumstances at s_0 (i.e., the worlds compatible with s_1, s_2 and s_3) are worlds where there is an action available to the agent whereby the worlds compatible with that action are P-worlds. For s_1 this action is a_5 . For s_2 this is either a_5 or a_7 , and for s_3 this is a_7 .²¹⁸

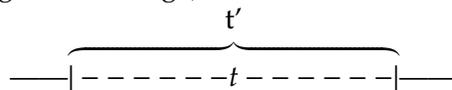
7.3.3 VIs and Imperfective Ability Attributions

What about imperfective-modified ability attributions? Recall the temporal orientation associated with the imperfective, repeated in the schematic below:

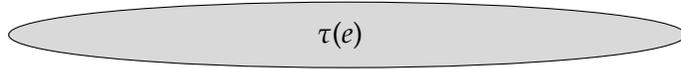
- (489) a. Habitual Reading (k-partition members are non-trivial intervals)



- b. In-Progress Reading (each instant in t' is a k-partition member)



218. An *aahkama'p-ohkott*-claim would be represented with the same diagram, as these diagrams only represent quantification over actions, and not the quantification over worlds. An *aahkama'p*-claim would thus be such that only some of the worlds compatible with s_1, s_2 and s_3 need be compatible with the *ohkott*-claim.



An imperfective ability claim is thus a claim where each of the k-intervals (trivial intervals in the case of the in-progress reading) of the reference time's superinterval overlaps with a time for which the *ohkott*- claim holds true - i.e., each k-interval overlaps with the action that *ohkott*-quantifies over. The $\tau(e)$ bubbles in the above diagrams should thus correlate to the runtimes of events that instantiate the actions that *ohkott*- quantifies over. As I've proposed that $\tau(e)$ also acts as the right-bound for the verifying instance requirement, this means that each k-interval right-demarcates an interval during which a P-event by the agent occurs. The important thing to note is that some of the k-intervals precede the reference time, where the reference time is either the utterance time t_0 , or a past interval t_{IPAST} . This means that some of these k-intervals are past-intervals. Thus the initial (left-most) k-intervals are fully-past intervals which must contain a P-event by the agent. This is why imperfective *ohkott*-claims require a past verifying instance - i.e., Davis et al. (2010)'s initial surprising observation.

To summarize to this point, in this section I have argued that the verifying instances associated with Blackfoot's ability modal can be modelled with a lexically-encoded assertability condition. I proposed that the assertability condition is an evidence-based one, and further suggested that evidence-based claims in Blackfoot, in general, are associated with a past-unbounded right-bounded interval. An important thing to note is that although I have presented the past-unbounded right-bounded interval for *ohkott*'-s verifying instance as being conceptually motivated (i.e., by the intuition that it is an evidence-based requirement, and that evidence is cumulative), it is also a move I am forced into given the theoretical assumptions I have been making and the empirical facts. The past-unbounded right-bounded analysis, whereby the right-bound is provided by *ohkott*'-s temporal perspective time, gives more flexibility than an analysis where the verifying instance is associated purely with *ohkott*'-s temporal perspective time. In particular, it allows the verifying instance to either (i) precede *ohkott*'-s temporal perspective time, (ii) be contained within *ohkott*'-s temporal perspective time, or (iii) straddle the left boundary of *ohkott*'-s temporal prespective time. This flexibility is necessary as (i) the present imperfective uses of *ohkott*- are associated with a required previous verifying instance - i.e., require a verifying instance that precedes *ohkott*'-s temporal perspective time - and (ii) past perfective uses of *ohkott*- do not require an additional previous verifying instance in addition to their actuality entailments - i.e., they allow the actualized preajcent event to act as the verifying instance, where (given my proposed temporal perspective and orientation for *ohkott*-) this event is contained within *ohkott*'-s temporal perspective time.

7.4 Copley's Original Puzzle

7.4.1 Strong Epistemic *must*

Recall that Copley (2006)'s original aim was to account for the apparent difference in strength between *must* and *should*. Can the analysis for Blackfoot *aahk-* be adopted for English (epistemic) *must* so that we predict the non-cancellability of its prejacent assertion?

Recall that the key of the analysis was (i) universal quantification, and (ii) a prejacent instantiation time contained within or overlapping with the temporal perspective time. Assuming an Efficacy requirement whereby the actual world must be identical to one of the worlds in the modal's domain of quantification for the modal claim's temporal perspective time, w_0 must be identical to one of these worlds for the temporal perspective time. Given universal quantification, all of the worlds in the modal's domain of quantification (including the one that w_0 is identical to) must be worlds where the temporally-indeterminate prejacent property holds true. If this temporally-indeterminate property is asserted to hold true at t , the temporal perspective time (i.e., we have a coinciding temporal orientation), then w_0 must similarly be a world where the temporally-indeterminate prejacent property holds true at t .

I will assume that the universal strength of English *must* is non-controversial, and focus on whether English *must* encodes a containment/overlap relation between its prejacent instantiation time and temporal perspective time.

The basic observation regarding the temporal orientation of English epistemic *must* is that its prejacent is always interpreted as describing a situation or event that overlaps with the present temporal perspective. (490) shows cases where the prejacent is stative or morphologically stativized; these stative(ized) prejacentes are interpreted as holding true of the (present) temporal perspective time.

(490) Stative or Stativized Prejacentes

- | | |
|---|-------------------------------|
| a. Gregor must have fallen in love with Laisa. | Present Perfect |
| b. Ivan must be pretending to be a fool. | Present Progressive |
| c. Mark must be hungry. | Present Stative (Stage-Level) |

Unmarked prejacentes are interpreted as present habitual (491), like an English simple present (492).²¹⁹ These habits are also interpreted as holding true of the (present) temporal perspective

219. Aspectually unmarked prejacentes for English deontic *must* are, of course, interpreted with a prospective interpretation. I abstract away from *must*'s deontic uses. Given the system for modals presented in this dissertation, however, we could assume a Kratzer (1981)-style un specification for *must*'s modal base. While an action-dependent deontic modal base provides the actions required to license a null prospective aspect, a hypothesis-dependent epistemic modal base does not. This is why epistemic and deontic *must* differ in their temporal orientations: while the latter accesses the

time.

(491) Aspectually Unmarked Eventive Prejacent

- a. Miles **must** suffer from a Napoleon Complex. (e.g., all the time, or intermittently)
- b. Gregor **must** fall in love with Laisa (e.g., every day)
- c. Ivan **must** pretend to be a fool (eg., every day)

(492) Simple Present

- a. Miles **suffers** from a Napoleon Complex. (e.g., all the time, or intermittently)
- b. Gregor **falls** in love with Laisa (e.g., every day)
- c. Ivan **pretends** to be a fool (e.g., every day)

English epistemic *must* thus appears to be associated with both (i) universal quantification over worlds and (ii) a coinciding temporal orientation. We thus predict the presence of actuality entailments, accounting for the generalisation that *must* is subject to Moore's Paradox. The formulation of Efficacy I propose, then, can account for one half of Copley (2006)'s original puzzle.

7.4.2 Should've, Could've, Would've

What about the other half of Copley (2006)'s original puzzle - i.e., the behaviour of English *should*? If Efficacy is a broad requirement on modals in English, as I propose it is for Blackfoot, why does English *should* lack an Efficacy requirement? I will assume that Copley (2006) is correct in her generalisation, whereby *must* is subject to an Efficacy requirement, but *should* is not. Instead of lexically stipulating this into *should*'s denotation, however, I tentatively suggest that *should*'s avoidance of an Efficacy requirement is not unique. Rather, *should* is a member of a set of modals, consisting of *should*, *could* and *would*, which all appear to lack Efficacy requirements, as shown in the examples below - all of these modal claims can be followed by denials of the prejacent proposition.

actions necessary to license a null prospective aspect, the former does not. This predicts that you can also get deontic readings with non-prospective interpretations. I believe this is the case, given examples like "You must have been living in the UK for a certain period of time (before you can apply for naturalisation)." Another example of a non-prospective deontic modal claim is provided by Arregui (2010):

- (i) Deontic Claim with Non-Prospective Interpretation (Arregui, 2010, pp. 251)

Context: There is a military parade in front of the governors house, and it is being shown on TV. A coin is tossed, and one of the soldiers, Joe, is randomly chosen to be shown in a close-up on TV.

Joe should have shaved.

- (493) a. Miles **could** have stopped his brother from escaping,
but he didn't.
- b. Mark **would** have gotten a better bargain,
but he wasn't there, so he didn't.
- c. Ivan's letter **should** have reached his mother by now,
but it hasn't.

The obvious observation is that *should*, *could* and *would* are not an arbitrary subset of the English modals. They can all be characterized by historical or "fake" past morphology **-ould**, in that these modals look "past" in terms of their morphological form, but they do not, in modern English, carry the expected past tense meaning. I suggest that the (synchronic) semantic contribution of this historical or "fake" past morphology is to indicate that the default Efficacy requirement does not hold. A question that arises, however, is how to implement this sort of semantic contribution. This question relies on a previous piece of the analysis that I have not yet made explicit: how exactly is the Efficacy restriction (repeated below in (494))²²⁰ encoded in the first place?

(494) **Efficacy**: $\exists w' [w' \in \text{MAX}_{G(w,t)}(\cap f(w,t))] [\text{IDENT}(w,w',t)]$

The default assumption that, for any modal expression, the world of evaluation, w , is identical with one of the worlds within the modal's domain of quantification, for the duration of the evaluation time, t .

I suggest that Efficacy is a definedness condition associated with a particular function contained within the denotation of the non-morphologically-past modals. Recall the basic denotations for modals I have been assuming:

(495) $[[\text{will}]]^{\text{h,c}} = \lambda P. \lambda t. \lambda x. \lambda w. \forall a \in \mathcal{A}(x,w,t)_{\leq \mathcal{B}(x,w,t)}$
 $\forall w' [[R(a,x,w',t) \& w' \in \cap C(x,w,t)_{\leq G(w,t)}]] \rightarrow P(x,w',t)]$

The subscripted $_{\leq G(w,t)}$ is a shorthand for the $\text{MAX}_{G(w,t)}$ function, which orders its argument (the set of worlds $\cap C(x,w,t)$) according to the propositions yielded by the ordering source G in w at t . It then yields a subset of $\cap C(x,w,t)$ consisting of the highest-ranked worlds. These are the worlds that the modal quantifies over. I propose that the MAX function of modals like *will* and *must* encodes the Efficacy requirement as a presupposition, but that the MAX function that modals like *should*, *could* and *would* use (call it MAX'), does not. Modals like *should*, *could* and *would* thus lack a crucial ingredient in deriving actuality entailments.

220. Again, here I abstract away from the action-dependent/evidence-dependent complications in the denotation, as the formulation of Efficacy is independent of those factors.

To summarize, in this chapter I have proposed an analysis for actuality entailments that involves three ingredients: (i) a temporally-constrained identity-condition on worlds (Efficacy) (ii) universal quantification over worlds and (iii) an overlap between the modal’s temporal perspective time and the prejacent’s instantiation time. In Blackfoot, one has the means of avoiding actuality entailments by removing factor (ii) or (iii) - i.e., one can use an existential modal, or one can use prospective aspect (and a prospective-aspect licensing modal like *áak-* or *aahkama’p-* if required). English, however, I have suggested, additionally has the morphological means of avoiding (i).

7.5 Summary of Chapter 7

In this chapter I provided an analysis for the presence/absence of actuality entailments in Blackfoot. The analysis made use of elements proposed in previous chapters - in particular, the universal analysis of ability modals and the proposed temporal perspectives and temporal orientations for *áak-* “will”, *ohkott-* “able to” and the imperfective *á-*. The sole new ingredient was the postulation of Copley’s notion of Efficacy, the intuition that the actual world, w_0 , is one of the worlds in the modal’s domain of quantification. This was re-framed as a temporally-restricted identity requirement between (i) the evaluation world and (ii) a world in the modal’s domain of quantification. The temporal restriction in question was that the identity requirement only holds for the duration of the modal’s temporal perspective time, as illustrated in figure 7.7.

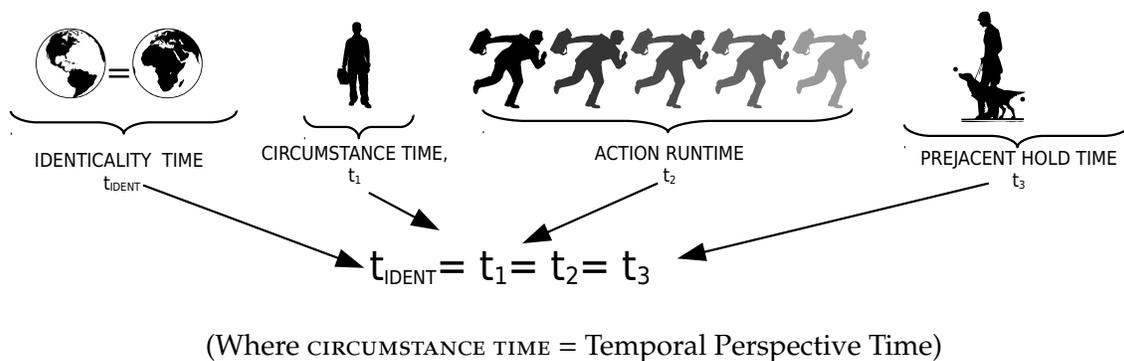


Figure 7.7: Time Correlation for a Blackfoot Circumstantial claim: With Identity Requirement

In the course of this chapter, I suggested that the non-cancellability associated with the prejacent assertion of strong epistemic modals could be unified under the same analysis. I also discussed a requirement for “verifying instances” associated with Blackfoot’s ability modal, arguing (i) that these are not actuality entailments (contra Davis et al. (2010)), as they are temporally distinct from actuality entailments and (ii) that their distribution can be formalized as a lexically-encoded assertability requirement on the speaker’s evidence. More specifically, I proposed that a speaker cannot make an *ohkott-* ability claim unless they have a previous verifying instance of the prejacent event type as evidence for the ability attribution. I suggested, however, that the temporal interval

in which the verifying instance takes place is not *ohkott*'s temporal perspective time, t , but rather a past-unbounded interval right-demarcated by t . Although this move was motivated by empirical and theoretical concerns, I suggested that it has conceptual underpinnings in the intuition that previous evidence, unlike previous circumstances or previous goals and desires, does not become obsolete and discounted in the face of new evidence. Rather, evidence is cumulative; old evidence should be kept and re-interpreted, as opposed to being excluded from consideration.

The type of evaluation interval proposed - i.e., a past-unbounded right-demarcated interval - parallels the temporal perspective time proposed for Blackfoot's epistemic modals *aahk*- and *aahkam*- in chapter 5. Although that move was similarly motivated by empirical and theoretical concerns, it is also amenable to the same conceptual underpinnings.²²¹ This suggests a broad (and tentative) hypothesis that all evidence-based claims (like the "verifying instance" requirement, and epistemic modal claims) in Blackfoot are associated with such a past-unbounded right-demarcated interval. Whether there is evidence for this is a question for further research. If further research pans out, however, then we can see a dichotomy between the temporal perspective times associated with action-dependent and evidence-dependent claims respectively: while action-dependent claims have temporal perspective times that correlate with the action(s) upon which the modal claims are dependent, evidence-dependent claims have temporal perspective times that correlate with past-unbounded right-demarcated intervals. The specification of the right-boundary, I have suggested, is subject to lexical variation, and can be the utterance time t_0 (as I have proposed is the case for Blackfoot *aahk*-), or the modal's λt variable (as I have proposed is the case for *ohkott*'s verifying instance and English *must*).

Note that the correlation between (i) the time for which the identity requirement holds, and (ii) the temporal perspective time (figure 7.7), reflects an extension of the original proposal regarding the correlation of times associated with Blackfoot circumstantial modals: in chapter 4 I proposed that a circumstantial modal's temporal perspective time correlates with the runtime associated with the action that the circumstantial modal quantifies over. This is represented in figure 7.8. I further proposed that these times correlate with the time for which the temporally-indeterminate prejacent property is asserted to hold, and elaborated on the empirical motivation for this claim in chapter 6. The schema representing the correlation of these three times is repeated in figure 7.9. The correlation of times between the identity requirement and temporal perspective time also parallels the correlation of times proposed in chapter 5, wherein I equated the time at which a conditional antecedent holds with the modal's temporal perspective time. The correlation of these four times is represented in figure 7.10.

221. The proposal of such a past-unbounded interval as *aahk*'s temporal perspective time was prompted by the empirical fact that aspectually-unmarked conditional antecedents in conditionals headed by *aahk*- are interpreted as past perfective, which, given the framework adapted from Reis Silva & Matthewson (2008), is only possible with a past interval evaluation time. Under the assumption that conditional antecedents are interpreted with respect to the matrix modal's temporal perspective time, the data required an analysis whereby *aahk*'s seemingly "present" evaluation time was actually a past-interval right-demarcated by the present/utterance time.

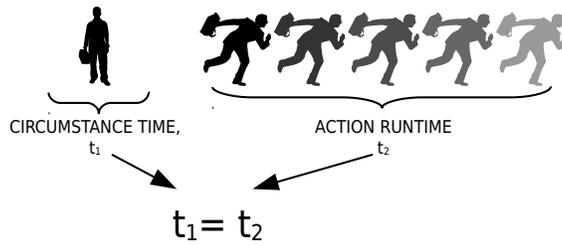


Figure 7.8: Time Correlation for a Blackfoot Circumstantial Claim Time: Part I

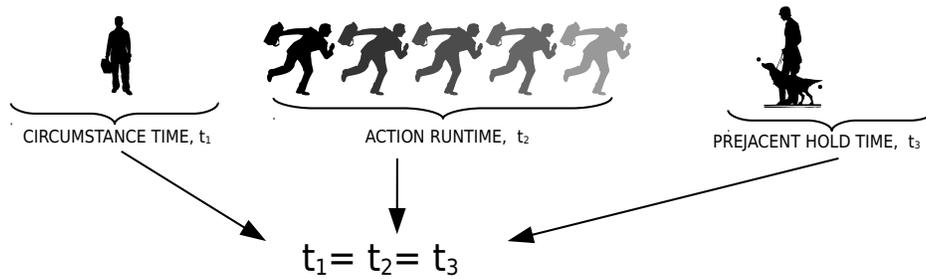


Figure 7.9: Time Correlation for a Blackfoot Circumstantial Claim Time: Part II

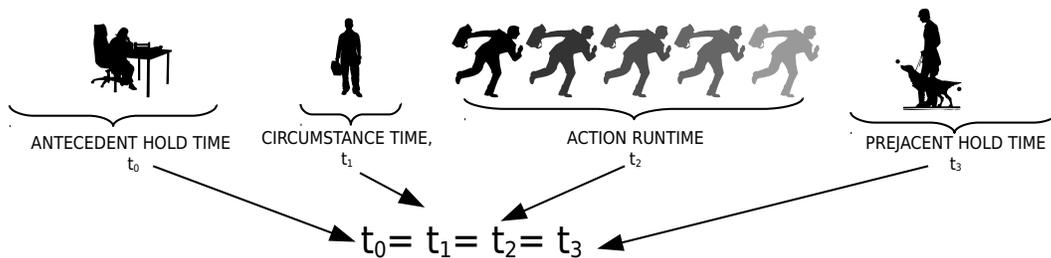


Figure 7.10: Time Correlation for a Blackfoot Circumstantial Conditional: With Antecedent Time

In the end, we arrive at a schema as in figure 7.11, where every temporally-sensitive predicate or relation referred to within the meaning of a circumstantial modal claim is evaluated with respect to a single evaluation time.

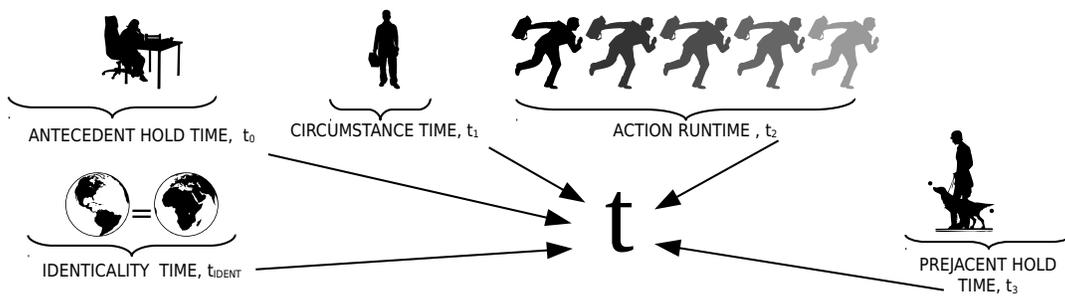


Figure 7.11: Time Correlation for a Blackfoot Circumstantial Claim

Chapter 8

Issues for Further Research

“Hasn’t your experience with the Time-Turner taught you anything, Harry? The consequences of our actions are always so complicated, so diverse, that predicting the future is a very difficult business indeed

Excerpt from *Harry Potter and the Prisoner of Azkaban*,
by J. K. Rowling

The main thesis that I have defended in this dissertation is the idea that actions must be incorporated into the grammar to properly account for the semantics of agency and circumstantial modality. I used original fieldwork from Blackfoot, an endangered First Nations language, in order to illustrate this claim. In this concluding chapter, I summarize the main empirical and theoretical contributions of the dissertation, compare and contrast the theoretical framework presented here with other linguistic frameworks, and then discuss further consequences and future avenues for research. The organization of the chapter is described in more detail as follows:

In section 8.1 I review the contributions of this dissertation. I first discuss the empirical contributions of the dissertation, and then the theoretical contributions.

In section 8.2, I discuss how the theoretical framework I have proposed stands in relation to other theoretical frameworks that introduce actions, or concepts similar to actions. In particular, I discuss the basics of Decision Theory, Portner (2007)’s analysis of imperatives, and Copley & Harley (2011)’s Force-Theoretic framework.

This leads into a discussion, in section 8.3, of how the proposed framework for the semantics of Blackfoot’s modal-temporal interactions can be situated with respect to the various morphosyntactic proposals that have been put forth for Blackfoot. In particular, I discuss how the proposed framework for tense-aspect-modal interactions is inconsistent with a Cinque (2002)-type universal hierarchy, and instead requires something like a minimalist Bare Phrase Structure approach or the Person/Participant-oriented syntactic hierarchy for Blackfoot represented by works such as Ritter & Wiltschko (2005, 2009), Bliss (2005), Bliss (2013), Ritter (2014). This section concludes with a discussion of how reconciling the action-based framework I propose with the morphosyntactic analysis presented in Bliss (2013) leads to the conclusion that Blackfoot’s TAM markers must be modifiers at the vP level. This is encouraging as this mirrors a conclusion that Ritter (2014) independently comes to when considering co-occurrence restrictions in Blackfoot abstract nomi-

nalization.

In section 8.4 I provide a brief glimpse into how circumstantial modality is expressed in other Algonquian languages. In particular, I provide an overview of Valentine (2001)'s description of circumstantial modality in Nishnaabemwin and Cook (2008)'s description of circumstantial modality in Plains Cree. The main observation is that the modal system I describe for Blackfoot is not a system that pervades the Algonquian language family. Circumstantial modality in Nishnaabemwin and Plains Cree differs from Blackfoot's system for circumstantial modality in significant and interesting ways.

I conclude with section 8.5, wherein I briefly discuss how the action-dependent perspective I have proposed could be used as a tool of investigation for issues in deontic or goal-oriented modality in Blackfoot, as well as other languages.

8.1 Looking Back: Summary of the Dissertation

In this section, I give a summary of the main contributions of the dissertation. First I summarize the empirical contributions, and then discuss the theoretical contributions.

8.1.1 Empirical Gains for Blackfoot

One of the main goals of this dissertation was to investigate and document previously undescribed formal semantic properties of Blackfoot. Although Blackfoot is a relatively undocumented and understudied language, it has been the subject of careful semantic fieldwork as represented by papers like Chin (2008), Dunham (2008), Reis Silva & Matthewson (2008), Reis Silva (2009b), and Reis Silva (2009a). Because of this previous research, established tests and generalisations regarding Blackfoot lexical aspect (Chin (2008)), grammatical aspect (Dunham (2008)), tense (Reis Silva & Matthewson (2008)) and modality (Reis Silva (2009b,a)) were already available. This put me in the position of being able to investigate some fairly complex semantic phenomena, like the interaction of these phenomena (tense and aspect) with modals and conditionals. This is exciting because investigation into these sorts of phenomena (e.g., conditionals, temporal perspective and temporal orientation) has, for the most part, been confined to work on very well-known and well-studied languages like English.²²² The empirical generalisations documented in the dissertation thus expand the linguistic community's crosslinguistic corpus of tense-aspect-modality interactions in a unique (and hopefully, interesting) way.

The data presented in this dissertation also represent empirical generalisations for Blackfoot that have not been captured in any of the excellent descriptive/teaching grammars like Frantz

222. Although see Cover (2010) and Barczak (2007), for exceptions.

(2009, 1991), Taylor (1969) and Uhlenbeck (1938). The Matthewson (2004)-style context-utterance-judgement tuples which I present as data are distinct from the sort of semantic data present in dictionaries, texts and grammars, and the sort of semantic generalizations one can extract from the data are correlatingly distinct. The data and empirical generalisations documented here thus add to the corpus of Blackfoot language data in a unique way, and can hopefully be used by future researchers and teachers of this endangered language.

The following list summarizes the new empirical observations documented in this dissertation:

1. The temporally-motivated stative/eventive distinction observed for Blackfoot non-modal claims by Reis Silva & Matthewson (2008) is paralleled in the modal domain - i.e., modal claims in Blackfoot fall into two temporal categories: stative-like and eventive-like.

While the “will” and “might” modals *áak-* and *aahkama’p-* behave like statives, being compatible with both past and present temporal perspectives, the ability modal *ohkott-* behaves like an eventive, in that its unmarked (perfective) form is only compatible with past temporal perspectives.

P	PAST	PRES		PAST	PRES
P _{stative}	✓	✓	<i>áak-P</i> <i>aahkama’p-P</i>	✓ ✓	✓ ✓
P _{eventive}			<i>ohkott-P</i>		
-unmarked	✓	×	-unmarked	✓	×
-imperfective	✓	✓	-imperfective	✓	✓

Table 8.1: Range of Temporal Perspective: Eventive and Stative Categories

2. Blackfoot conditionals fall into at least three (morphologically indistinct) categories: ontic conditionals, evidential conditionals and relevance conditionals. These categories are distinguishable by (i) the varying modal elements necessary to license the conditional antecedent and (ii) the range of temporal interpretations allowed for the conditional antecedent.

MODAL Environment	CNSQ	if-clause Licensed?
FUTURE	<i>áak-P</i>	✓
MIGHT	<i>aahkama’p-P</i>	✓
ABILITY	<i>ohkott-P</i>	×
IMPF _{EPISODIC}	IMPF-P	×
IMPF _{GEN}	IMPF-P	✓

Table 8.2: Licensing Ontic Conditionals with Modals

First, ontic conditionals require specific overt modal elements in order to be licensed: while the modals *áak-*, *aahkama’p-*, and generic readings of the imperfective *á-* license ontically-interpreted if-clauses, the ability modal *ohkott-* and in-progress readings of the imperfective

á- fail to do so. Evidential and relevance conditionals, on the other hand, do not require an overt modal for licensing.

Second, ontically-interpreted if-clauses, depending on their morphological clause-type, are subject to the temporal/epistemic restrictions shown in Table 8.3: ontically-interpreted SUBJUNCTIVE if-clauses cannot be interpreted as past (unless a past reference time is made salient), and unless the if-clause is counterfactual, an ontically-interpreted UNREAL if-clause must be interpreted as past.

(i)↓ (ii)→	SBJ ANTC		UNR ANTC	
	Possible	CFAC	Possible	CFAC
Past	×	×	✓	✓
Present	✓	✓	×	✓
Future	✓	✓	×	✓

Table 8.3: (i) Temporal and (ii) Epistemic Restrictions on Ontic Antecedents

Evidential and relevance if-clauses marked with SUBJUNCTIVE morphology, on the other hand, are not restricted to non-past temporal interpretations.²²³

- The so-called “future” modal *áak-* is not in a 1:1 correlation with future temporal interpretations: (i) there are contexts where a future/prospective interpretation is licensed without *áak-*, such as a conditional antecedent, and the complement of the modal *aahkama’p-* (Table 8.4), and (ii) there are contexts where *áak-*’s complement is interpreted as non-future (Table 8.5) - i.e., when it takes a stative (or stativized) complement.

Prospective Aspect Licensed in:	English	Blackfoot
Prejacent of <i>áak-</i> , <i>aahkama’p-</i>	✓	✓
Conditional Antecedents	✓	✓
Imperfective “Futurates”	✓	×
Unmarked Assertions	×	×

Table 8.4: Allowed Future Contexts

<i>áak-</i> ’s complement:	Eventive	Stative
Present Reading	×	✓
Future Reading	✓	✓

Table 8.5: *áak-*’s Allowed Temporal Orientations

- Blackfoot *ohkott-* ability attributions are subject to strict licensing conditions depending on the interaction between (i) the aspectual marking of the *ohkott-P* claim, (ii) knowledge of a

223. So far I have not yet been able to elicit evidential or relevance conditionals with UNREAL morphology. Further investigation is required in order to determine whether this is because the constructions are impossible, or whether they are subject to strict licensing conditions.

previous verifying instance of P, and (iii) the possibility of a future instance of P. Perfective ability attributions require a real-world past instance of P (an actuality entailment that also passes as a verifying instance), imperfective ability attributions require both a real-world past instance of P (a verifying instance) as well as the possibility of a future instance, while future-marked ability attributions only require the possibility of a future instance. Table 8.6 is a summary of the contexts in which the various forms of the ability attribution are felicitous.

CONTEXTS ↓	PFV-ohkott-P	IMPF-ohkott-P	FUT-ohkott-P
Context A: ×Previous Instance ✓Future Instance	×	×	✓
Context B: ✓Previous Instance ✓Future Instance	✓	✓	✓
Context C: ✓Previous Instance ×Future Instance	✓	×	×

Table 8.6: Felicity Judgements for Blackfoot Ability Attributions

8.1.2 Theoretical Claims: Actions, Agency and Intentions

One of the main theoretical claims of this dissertation is that several insights can be drawn if the distinction between circumstantial and epistemic modals is reframed as a distinction between action-dependent and hypothesis-dependent modals. The other main theoretical claim is that formalizing agency in terms of a branching-time STIT-style semantics allows for insights regarding the stative/eventive distinction. In particular, it presents a reason for why the stative/eventive distinction is often described in terms of tangled interactions between agentivity and temporality: agentivity and temporal eventiveness are so often intertwined because the truth-conditions of agentive “STIT/see-to-it-that” operators are defined in terms of distinct conditions holding at (necessarily) distinct evaluation times (cf. Belnap (1991), Belnap & Perloff (1988)).

The majority of the dissertation focussed on the analytical benefits of reframing circumstantial modals with an action-dependent semantics: In the spirit of Brown (1988), I proposed that an existentially quantifying action-dependent semantics for ability (i.e., ability *ohkott-*) and a universally quantifying action-dependent semantics for metaphysical modality (i.e. *áak-* “will” and *aahkama’p-* “might”) provides a better way to account for (i) the intermediate strength of ability claims (chapter 7, cf. Xie (2012), Thomason (2005), Giannakidou (2001)), and (ii) the intuition that the latter kind of modals (i.e. the universals *áak-* “will” and *aahkama’p-* “might”) often seem to be claims about an agent’s intentions/commitments (chapter 6, cf. Copley (2002, 2009)). The reasoning was as follows: a modal element that universally quantifies over the actions available to an agent also indirectly encodes information about the actions that are no longer available to the agent, e.g.,

because the actions in question have been ruled out by the agent's intentions/commitments. It thus indirectly encodes information about the agent's intentions and commitments. This is not the case, however, for an element that existentially quantifies over the actions available to an agent; making an assertion about one possible action does not allow the speaker or hearer to infer anything about the totality of actions no longer available.

I used the idea that the universal action-quantifiers can access intentions/ commitments in order to describe which modals license prospective ("future") aspect in their complement. The underlying intuition is that the actual world (and w_0 , its counterpart in the semantic model) is metaphysically undetermined for what happens in the future, but that present intentions, plans and commitments can be used to infer parts of the future (cf. Schulz (2008)). Because action-dependent modals like *áak-* and *aahkama'p-* indirectly encode information about the agent's intentions and commitments, they succeed in licensing (fully) prospective interpretations where other modal elements (e.g., epistemic *aahk-* and the imperfective *á-*) fail (chapter 6).²²⁴

The licensing of prospective interpretations, I argued, is important for accounting for which modal elements in Blackfoot license causally-interpreted conditional antecedents (chapter 5). Under the assumptions that (i) only forward causation is possible (i.e., the antecedent cause must precede the consequent result), and (ii) conditional antecedents are interpreted with respect to the consequent modal's temporal perspective time, I proposed that causally-interpreted conditionals in Blackfoot are subject to a (semantically) grammaticalized restriction whereby the antecedent event's instantiation time must completely precede the consequent event's instantiation time. Only modal elements allowing this sort of temporal configuration (i.e., those that license prospective aspect, or those with temporal orientations that otherwise allow for a prospective configuration) license conditional antecedents. The modal element that "otherwise allows for a prospective configuration" (albeit only partially) is the imperfective *á-*. I proposed that the modal component of the imperfective *á-* can also be characterized as action-dependent, although instead of quantifying over actions, as proposed for the previously-mentioned modals, it instead makes reference to a particular action: the null action. Although the imperfective does not license a prospective interpretation for its prejacent, I proposed that its lexically encoded temporal properties (inspired by Deo (2009)) nonetheless allowed for the proper type of prospective configuration.

Another aspect of my proposal that circumstantial and epistemic modals be reframed in terms of being action-dependent and evidence-dependent modals respectively involves their temporal profile: I proposed that action-dependent and evidence-dependent modal claims diverge in terms of their temporal perspectives (i.e., the type of temporal perspective times they allow, cf. Condoravdi (2002), Ippolito (2003), Laca (2008)). More specifically, for Blackfoot:

224. Recall that the action-dependent modal *ohkott-* "able" does not license prospective aspect. I argued in chapter 4 that this is a consequence of its agentivity requirement and does not reflect a lack of action-dependency.

- (i) an action-dependent modal's temporal perspective correlates with the run-time of the action(s) upon which the modal claim is dependent, and
- (ii) an evidence-dependent modal's temporal perspective correlates with the interval associated with the evidence one's claim must account for; because evidence is cumulative, this is a past-unbounded interval.

The majority of the dissertation's content focussed on the temporal properties of the action-dependent (circumstantial), as opposed to evidence-dependent (epistemic), modals. I suggested that the proposed correlation in (ii) (between the run-time of the referred-to actions and temporal perspective) predicts variation in terms of whether action-dependent modal claims in Blackfoot behave as temporally "stative" or temporally "eventive" (chapter 3). The core of the prediction can be characterized as based on the notion that the only action with an instantaneous run-time is the null action. Thus only modal elements that can refer to the null action (i.e., the universals "future" *áak-*, "might" *aahkama'p-* and the null-action referring imperfective *á-*, which lack an agentivity requirement) can hold true of the (instantaneous) present. This is characteristic of stative predicates in Blackfoot. Modal elements that cannot refer to or quantify over the null action (i.e., ability *ohkott-*, because it is subject to an agentivity requirement that requires a non-null action), on the other hand, have temporal perspectives correlating to non-instantaneous (i.e., non-trivial) intervals. They thus cannot hold true of the present, and can only hold true of past evaluation times (cf. Reis Silva & Matthewson (2008), Bennett & Partee (1978)). This is characteristic of eventive predicates in Blackfoot. This prediction properly describes the temporal behaviour of the aforementioned modal elements, as shown in chapter 3.

The proposed temporal profiles and strengths of the modal elements discussed in chapters 4, 5, and 6 came together in chapter 7, where I proposed that the temporal orientation (i.e., the relationship between the temporal perspective time and the preajacent event's instantiation time) is a crucial factor for deriving actuality entailments (cf. Bhatt (2006), Hacquard (2006), Kratzer (2011), Matthewson (2012)). I proposed that the derivation of actuality entailments is not restricted to circumstantial/action-dependent modal claims, but rather arises from the confluence of two factors: (i) a temporally-constrained identity requirement between the evaluation world and a modal claim's domain of quantification, and (ii) universal quantification over worlds. Strong epistemic claims, I argued, present with precisely the same symptoms that ability modals with actuality entailments do: a speaker cannot use such claims when they know that the preajacent claim is false, or follow up such claims with a denial of knowledge regarding the truth of the preajacent claim.

Although Blackfoot, and not English, is the focus of this dissertation, many of the claims I make for Blackfoot could also be applied to English. For instance, I believe that action-dependent and evidence-dependent modals in English likewise differ in their temporal profile, where evidence-dependent modals in English are much as I've proposed for Blackfoot. Action-dependent modals

in English, however, do not appear to have temporal perspectives that systematically correlate to the runtime of the action upon which the modal is dependent. The ability predicate *able to*, for instance, behaves like a stative predicate, being compatible with present tense without additional aspectual morphology. The predicate *try to*, on the other hand, behaves more like an eventive predicate, requiring progressive morphology in order to combine with the English present tense.

- (496) a. Joanne is **able to** make chocolates.
b. *Joanne is **try to** make chocolates.
c. Joanne is **trying to** make chocolates.

I leave a more detailed investigation of temporal perspective times in English for future research.

The underlying intuition behind the theoretical themes that run throughout the dissertation is one of non-determinism - i.e., the intuition or viewpoint that agents with free will can (and do) affect how the world unfolds. Inferences about the future, and grammaticalized ways of expressing such inferences, should make reference to the choices and actions an agent makes. Although I have focussed on using a certain implementation of this intuition in order to provide an explanatory semantic account of interactions between (i) circumstantial modals and conditionals and (ii) temporality in Blackfoot, the theoretical claims that I have proposed have the potential to shed light on phenomena beyond Blackfoot, and beyond the particular modal/temporal phenomena I have focussed on. In the following sections, I discuss how the theoretical implementations proposed here have connections to other theoretical frameworks, and then discuss how the general implementation of actions into a semantic framework could be extended to account for other kinds of linguistic phenomena.

8.2 Connections to Other Linguistic Theories

In this section I discuss how the action-dependent semantics I propose for circumstantial modality has connections to other theoretical frameworks that introduce actions, or elements similar to actions. First I discuss decision/game theoretic approaches in linguistics, which treat actions as primitives, then Portner (2007)'s incorporation of actions into an analysis of imperatives, and finally I discuss Copley & Harley (2011)'s notion of a "force" and the notion of an "initiating subevent" à la Ramchand (2008) and Travis (2000).

8.2.1 Decision/Game Theoretic Approaches to Linguistics

The notion of an action, or decision, is a basic ingredient in decision theory and game theory, and many researchers have shown that these theories are useful for analyzing language. For example, Van Rooy (2003) proposes that the meaning of questions is context-dependent, only being

fully specified with respect to a contextually-salient decision problem; Csipak (2013) proposes that unembedded factive subjunctives in German are hidden relevance conditionals that refer to contextually-salient decision problems; Jäger (2008) discusses how game theory can be used to formalize the Gricean principles underlying rational conversation. In what follows I will describe the basic theoretical ingredients of decision theory (and extensions for game theory), and then discuss how this relates to the theoretical framework I have proposed.

Basic Decision Theory

According to Resnik (1987), Decision Theory subsumes a broad collection of theories (mathematical, logical and philosophical) regarding how rational individuals (alone or in groups) make decisions.²²⁵ The basic framework for Decision Theory distinguishes between three different kinds of components: options or *acts*, *states* and *outcomes*. Resnik (1987) provides the following example:

...suppose I have just entered a dark garage that smells of gasoline. After groping to no avail for a light switch, I consider lighting a match, but I hesitate because I know that doing so might cause an explosion.

The decision problem deals with the question of which *act*/action a rational agent should take: light a match, or do not light a match. There are two possible *outcomes*: explosion, and no explosion. These outcomes depend on (i) which action is taken, and (ii) the amount of gasoline vapour in the garage - i.e., the *state* or environment in which the possible actions take place. All of the elements of the decision problem can be represented in Table 8.8.

Actions ↓ <i>States</i> →	<i>Gas level: Explosive</i>	<i>Gas level: Non-explosive</i>
Light a match	Explosion	No explosion
Don't light a match	No explosion	No explosion

Table 8.7: What to Do in a Dark Room with a Possible Gas Leak

The actions, states and outcomes represented in a decision problem must be mutually-exclusive and exhaustive. The particular breakdown/individuation of actions, states and outcomes represented in the decision table is an analytical problem. An important factor to take into account is the sort of outcomes that are desirable. Consider, for instance, Resnik (1987)'s alternate situation:

I want to cause an explosion to scare some friends who are with me. But I am a practical joker, not a murderer, so I want the explosion to be non-damaging.

The changed goals result in a changed decision table; the previous outcome 'Explosion' must be broken down into two different kinds of explosion outcomes: 'Damaging Explosion' and 'Non-damaging Explosion.' And because the amount of damage depends on the magnitude of the

225. Decision Theory can be viewed as divided along two branches: prescriptive (normative) and descriptive decision theory. Another division can be made in terms of whether the decisions being studied are individual decisions or group decisions. For my purposes, I abstract away from these differences.

explosion, which in turn depends on the amount of gasoline vapour in the garage, the individuation of the relevant states must also be revised according to the possible amounts of gas in the garage, as in Table 8.8.

Actions ↓	States →	<i>Gas level:</i> <i>Very Explosive</i>	<i>Gas level:</i> <i>Mildly Explosive</i>	<i>Gas level:</i> <i>Non-explosive</i>
	Light a match		Damaging	Non-damaging
Don't light a match		No explosion	No Explosion	No explosion

Table 8.8: How to Cause a Non-Damaging Explosion

Although the revised situation and decision problem happened to only require a distinct individuation of states and outcomes, the same sort of analytical decision is required to determine which actions should be represented in the decision table.

In some cases, an agent can be sure that in taking a particular action, they guarantee a particular outcome. This requires that they have a certain degree of knowledge regarding the state in which they perform the action. It is often the case, however, that the agent does not know what state the actual world is, and hence they cannot be sure what outcome their action will yield. In these cases, the choice of which action a rational agent should take does not depend solely on which outcomes best achieve the goals the agent has. It also depends on how likely it is that each action will result in the predicted outcome. This in turn depends on the probability accorded to each state represented in the decision table.

To summarize: Decision Theory has three main components - *acts* (or *actions*), *states* and *outcomes*. The choice of which action to take depends on (i) the goals/desires of the agent, and (ii) the probability the agent assigns to each state. In the next subsection, I discuss how Van Rooy (2003) formalizes these components.

Formalizing Decision Theory

Van Rooy (2003) formalizes the three components of decision problems as follows: A decision problem consists of a set of alternative actions, $\mathcal{A} = \{a_1, a_2, \dots, a_n\}$. These actions take place in possible worlds in $W = \{w_1, w_2, \dots, w_n\}$. These represent the various *states* the action may take place in. The 'best' action in \mathcal{A} depends on how desirable or useful the various outcomes are, where each outcome is represented as an action-world pair $\langle a, w \rangle$. These are represented below in (497).

(497) Ontological Elements of Decision Theory

- a. $\mathcal{A} = \{a_1, a_2, \dots, a_n\}$ ACTIONS
- b. $W = \{w_1, w_2, \dots, w_n\}$ WORLDS

c. $O = \mathcal{A} \times W =$
 $\{ \langle a_1, w_1 \rangle, \langle a_1, w_2 \rangle, \langle a_2, w_4 \rangle, \langle a_2, w_3 \rangle, \dots, \langle a_n, w_n \rangle \}$ OUTCOMES

The decision problem can be represented as a triple, $\{P, U, \mathcal{A}\}$, where **U** is a utility function, which represents the desires of the agent. It maps from outcomes (action-world pairs), to real numbers, where a higher number for an outcome correlates with a higher utility/desirability. **P** is a discrete probability function, which represents the agent's beliefs regarding the state of the actual world. It maps from worlds, w , in W , to numbers between 0 and 1, where 0 represents no probability and 1 represents a 100 percent probability (certainty).

- (498) a. Utility function, $U(a,w)$
 maps from action-world pairs to real numbers
 (higher number = higher utility)
- b. Discrete Probability function, $P(w)$,
 maps from worlds to numbers in $[1,0]$
 (higher number = higher probability)

Because an agent cannot be sure what state w_0 correlates to, the decision she makes is not based on the utility/desirability of the actions, $U(a,w)$, but on their expected utility, $EU(a)$. The expected utility of an action, $EU(a)$, is derived by multiplying the probability and utility of the various outcomes associated with the action, and then taking their sum. This is represented in (499).

(499) $EU(a) = \sum_w P(w) \times U(a, w)$

Van Rooy (2003) and Question-Answer Pairs

How can the formalization of Decision Theory described above be used within linguistic analysis? Van Rooy (2003) uses Decision Theory to account for contextual variation in terms of what counts as 'resolving' a question. For instance, consider the question "Who needs a handout?" in two different contexts:

- (500) **Context 1 (Mention-All):** I'm one of the student-volunteers for a conference, and my job is to make sure everyone gets handouts for the talks. One talk is going to begin, and some people have grabbed handouts on their way in, but others have missed the handouts. I have the stack of handouts and ask:

Q: Who needs a handout?

A: Mike does.

Q: Who else needs a handout? (unresolved)

(501) **Context 2 (Mention-Some):** The presenter didn't make enough handouts for the audience, and there are several people without handouts. I accidentally grabbed two handouts and I ask:

Q: Who needs a handout?

A: Mike does.

(resolved)

In a 'mention-all' context like context 1, in order for the question to be resolved, I need to identify all of the individuals with the property expressed in the question - i.e., I need to identify all of the individuals with the 'need-a-handout' property. In a 'mention-some' context like context 2, however, the identification of a single individual with the relevant 'needs-a-handout' property is sufficient to resolve the question.²²⁶

The basic question that Van Rooy (2003) addresses is how to account for both the Mention-All and Mention-Some reading. He points out that Groenendijk & Stokhof (1984)'s partition-analysis of questions holds that the meaning of a question is its set of resolving answers. This requires that to resolve a question, the answerer must give the exhaustive list of individuals with the relevant property in w , and implicate that this is the whole list. In other words, the Groenendijk & Stokhof (1984) approach to questions can account for the Mention-All readings, but not the Mention-Some readings. A Hamblin (1973) approach to questions, on the other hand, defines resolvedness in terms of mentioning only some of the relevant individuals. This can account for the Mention-Some readings, but not the Mention-All readings.

Zeevat (1994) and Beck & Rullmann (1999) take a Groenendijk & Stokhof (1984)-style approach, but the analyses they provide are more nuanced. Instead of characterizing the meaning of a question as its entire set of resolving answers, these researchers propose that the meaning of a question is characterized by a subset of the set of resolving answers - in particular, those answers that are most *optimal* or *informative*. They formalize their analyses in the following manner. Consider the denotation for questions that Groenendijk & Stokhof (1984) propose, where a question denotes the complete set of its possible answers, or equivalently, a partition of the worlds in the context set:

(502) Groenendijk & Stokhof (1984)'s Questions:

$$\llbracket ?xPx \rrbracket^{h,c} = \lambda w. \lambda v. [\lambda x. P(w)(x) = \lambda x. P(v)(x)]$$

Zeevat (1994) modifies this denotation by introducing a function, Op , which applies to a predicate, P and world, w , and yields a unique 'optimal group' or 'number' that satisfies P in w .

226. In some dialects of English, the 'mention-all' use can be explicitly marked with *all* - i.e., a question like "Who all needs a handout?" is felicitous in the context 1, but not context 2. Thanks to Natalie Weber for verifying these judgements.

(503) Zeevat (1994)'s Questions

(Adapted by Van Rooy (2003))

$$\lambda w. \lambda v. [Op(P)(w) = Op(P)(v)]$$

The question then, is how to properly characterize the function *Op*. As mentioned above, Zeevat (1994) and Beck & Rullmann (1999) argue that the unique optimal group/number is the group/number that yields the most *informative* answer. Zeevat (1994) formalizes this by defining *Op* as *Exh*, (504), which orders the answers in terms of entailment, and yields the most informative 'group' or 'number'. In some cases this correlates with the maximal group/number - e.g., with questions like "How many meters can you jump?" (cf. Rullmann (1995)), and in other cases this correlates with the minimal group/number - e.g., with questions like "In how many seconds can you run 100 meters?"

$$(504) \quad \llbracket Exh(P) \rrbracket^{h,c} = \{ \langle w, g \rangle \mid P(w)(t) \ \& \ \neg \exists g' \neq g [P(w)(g') \ \& \ P(g') \models P(g)] \}$$

The problem with these approaches, Van Rooy (2003) argues, is that the mention-some answers cannot be characterized as the most informative answer. Rather, as observed by Ginzburg (1995), we want an approach to questions that is sensitive to the **GOALS** of the questioner. Recall the contexts provided in (500): in context 1, the questioner's goal is to ensure that everyone has a handout; in context 2, the questioner's goal is to get rid of their extra handout in a useful way. It is this observation about sensitivity to the questioner's goals that Van Rooy (2003) aims to formalize with the technical aspects that Decision Theory provides.

Van Rooy (2003) proposes that the issue of whether a question can be resolved with a mention-some or mention-all strategy depends on the **DECISION PROBLEM** that the questioner wants to solve. The contextually-specified notion of resolvedness, he proposes, reflects the underlying meaning of a question; he proposes that the meaning of questions is underspecified by the compositional semantics, and that this underspecification is resolved via a contextually-salient decision problem. Van Rooy (2003)'s approach is based on the intuition that asking questions allows the agent to better determine what *w* is, and hence what the utility (and expected utility) of the various actions open to them are.

How exactly does Van Rooy (2003) incorporate a contextually-salient decision problem into the meaning of a question? Van Rooy (2003) takes the same approach that Zeevat (1994) and Beck & Rullmann (1999) do, but he proposes that *Op* not be defined in terms of the most informative answer, but rather be defined in terms of the most relevant answer - i.e., the answer that helps more in resolving the questioner's contextually-salient decision problem. Consider, for example, the following question context, provided by Van Rooy (2003):

(505) **Context:** I want an Italian newspaper and wonder where I should walk - to the station or the palace.

Where can I buy an Italian newspaper?

Given the decision problem at hand (i.e., which action should the agent take to get an Italian newspaper), the set of alternative actions, \mathcal{A} , gives rise to a set of propositions, $\{s, p\}$, where s correlates with walking to the station, and p correlates with walking to the palace. Assume a simplified model with three relevant worlds, u , v , and w , where in u you can only buy an Italian newspaper at the station, in v you can only buy one at the palace, but in w both places sell Italian newspapers. With this set-up, taking the action s is optimal in u and w , but the action p is optimal in v and w . In contrast to the partition predicted by Groenendijk & Stokhof (1984) (i.e., $\{\{u\},\{v\},\{w\}\}$, a mention-all answer), the decision problem sets up a division of possible worlds as follows: $\mathcal{A}^* = \{\{u,w\}, \{v,w\}\}$, defined in terms of the possible actions considered.

(506) **Context:** I want an Italian newspaper and wonder where I should walk - to the station or the palace.

Where can I buy an Italian newspaper?

$\mathcal{A}=\{s, p\}$

s: walk to the station

p: walk to the palace

$W=\{u,v,w\}$

u: Only the station sells Italian newspapers
(s optimal)

v: Only the palace sells Italian newspapers
(p optimal)

w: Both station and palace sell Italian Newspapers
(s and p both optimal)

$\mathcal{A}^* = \{\{u,w\}, \{v,w\}\}$

If the answerer knows the world is w , a partial answer like “(at least) the station” is appropriate, because it solves the questioner’s decision problem of whether to take action s (walk to the station) or p (walk to the palace) in order to obtain an Italian newspaper - they should take s . Although the answer “The station and the palace” is more informative, it is not more useful in terms of the goals of the questioner. In order to formalize this sensitivity to the questioner’s goals, Van Rooy (2003) provides the following semantics for questions:

(507) $\llbracket ?xPx \rrbracket^{h,cR} = \{\lambda v.[g \in Op(P)(v)] : w \in W \& g \in Op(P)(w)\}$

$\llbracket Op(P) \rrbracket^{h,c} = \{\langle w, g \rangle | P(w)(g) \& \neg \exists g' [P(w)(g') \& P(g') < P(g)]\}$

The denotations rely on an ordering, $<$. While this ordering reflects informativity (\models) for Zeevat (1994) and Beck & Rullmann (1999) (as in (504)), Van Rooy (2003) proposes an ordering $<_{\mathcal{A}^+}$, where

\mathcal{A}^+ refers to the division of worlds made by the contextually-salient decision problem. An answer $P(g')$ is higher ranked by $<_{\mathcal{A}^+}$ than an answer $P(g)$ if and only if it eliminates more actions/cells of the contextually-salient decision problem \mathcal{A}^+ . This is formally defined below:

$$(508) \quad P(g') <_{\mathcal{A}^+} P(g) \text{ iff} \\ \{a^* \in \mathcal{A}^* \mid a^* \cap \llbracket P(g') \rrbracket^{h,c} \neq \emptyset\} \subset \{a^* \in \mathcal{A}^* \mid a^* \cap \llbracket P(g) \rrbracket^{h,c} \neq \emptyset\}$$

In some cases \mathcal{A}^* correlates to a partition - in these cases, we derive ‘mention-all’ readings. In other cases, like the Italian newspaper case, where \mathcal{A}^* is not as fine-grained, \mathcal{A}^* does not correlate to a partition, deriving a ‘mention-some’ reading.

To summarize, Van Rooy (2003) incorporates Decision Theory into the semantics of questions by defining the semantics of questions in terms of the most relevant true answer, where an answer, A , is more relevant than an answer A' if A helps more to resolve the asker’s decision problem. He formalizes this by incorporating the contextually-determined ordering, \mathcal{A}^* , into the denotation of the question operator. Going through Van Rooy (2003)’s analysis of resolving questions allows us to see how incorporating actions into a formal semantic theory can be used to account for empirical phenomena beyond the data that I address. The Decision-Theoretic implementation that he adopts also provides us with a more fully-specified means of encoding the agent’s desires/commitments/plans, in the form of a utility function. In the following section, I discuss further how Van Rooy (2003)’s approach provides helpful inroads towards extending and further formalizing the action-dependent approach to circumstantial modality I have proposed.

Decision Theory and Action-Dependent Circumstantial Modals

In this section I discuss how the proposed incorporation of actions into the semantics of circumstantial modals relates to Decision Theory, and Van Rooy (2003)’s incorporation of Decision Theory into a linguistic framework. Both approaches can account for different ranges of data - i.e., Decision Theory can account for linguistic phenomena that my action-dependent framework lacks the machinery for, and my action-dependent framework can account for linguistic phenomena that Decision Theory cannot. Fundamentally, however, the two approaches are not incompatible; the different ranges of data that the two approaches account for reflect different methods and different research goals, as opposed to core philosophical differences.

The basic modal framework that I built my analysis on already incorporated a set of possible worlds, W . The incorporation of a set of actions, **Act**, thus allows for all three most basic components of Decision Theory: Actions in **Act**, states/worlds in W , and outcomes as action-world pairs **Act** \times W . An important area of inquiry that I incorporate into my analysis, however, which Decision Theory does not address, is how these basic components (actions, worlds, outcomes)

interact with the domain of events, E , and the domain of times, I .²²⁷ As Van Rooy (2003) notes, his incorporation of Decision Theory into an analysis of questions is situated among several works that incorporate theories of rational behaviour (like Decision Theory, Game Theory, etc.) into the analysis of assertions and conversational implicatures (Parikh (2001), Parikh (1994), Merin (1999), van Rooy (2001)). Like the majority of analyses meant to account for interactions between meaning and context, however, these are incorporated into a dynamic semantic framework, where dynamic frameworks usually abstract away from sub-sentential phenomena like tense, aspect and modality.²²⁸ The action-dependent semantics for circumstantial modality and agency that I have presented is thus unique among linguistic work that incorporates theories of rational behaviour in that it deals with these sub-sentential phenomena.

On the other hand, important and useful parts of Decision Theory that I have not incorporated are (i) the utility function, U , which represents the agent's goals/desires, and (ii) the discrete probability function, P , which represents the agent's beliefs regarding their circumstances. The inclusion of actions without the inclusion of U and P was a simplification on my part based on what sort of machinery was required in order to account for the particular empirical phenomena I discussed. As one of the main differences between the actions quantified over by the agentivity operator, v_{stit} , and the action-quantifier incorporated into the denotations of the circumstantial modals is precisely whether the actions quantified over are actions in general, or only the actions that the agent considers 'open' to them, reference to some sort of formal element representing the agent's goals/desires and the agent's beliefs regarding their own circumstances is necessary. The reason I did not incorporate a utility function or discrete probability function was not because I don't think language makes reference to these (or similar) elements, but rather because the particular empirical generalisations that I aimed to account for (i.e., the patterns of temporal perspective, the licensing of conditional antecedents, restrictions on the temporal and epistemic interpretations of antecedents, etc.) could be accounted for without a *concrete formalization* of the agent's goals/desires and the agent's beliefs regarding their circumstances. The components of Decision Theory, however, provide us with a possible way of formalizing 'the actions open to an agent.' Consider the basic template for a circumstantial modal, repeated in (509). In addition to the action modal base, \mathcal{A} and circumstantial modal base C , there is a bouletic ordering $\leq \mathcal{B}$.

$$(509) \quad \llbracket \text{MOD} \rrbracket^{\text{h,c}} = \lambda P. \lambda x. \lambda t. \lambda w. \mathbf{Q}_1 a \in \mathcal{A}(x, w, t)_{\leq \mathcal{B}(x, w, t)} \\ \mathbf{Q}_2 w' [w' \in [\lambda w' [R(a, x, w', t) \& w' \in \cap C(x, w, t)_{\leq G(w, t)}]] \rightarrow P(x, w', t)]$$

The bouletic ordering $\leq \mathcal{B}$ can be reframed as short-hand for an interaction between a utility

227. Recall that I related actions in **Act** to events and times by proposing, following Chierchia (1998), that actions are event-kinds. Actions are thus related to their instantiations, which are events, via an instantiation relation, and these events are then related to times via a temporal trace function á la Krifka (1992).

228. Kamp & Reyle (1993)'s Discourse Representation Theory (DRT) is an exception to this claim. That framework is a dynamic approach that does not take propositions as atomic primitives, and thus can interact with sub-sentential phenomena like tense, aspect and pronouns. They do not incorporate actions into their framework, however.

function U , and a discrete probability function P - i.e., as a version of Van Rooy (2003)'s $\leq_{\mathcal{A}}$.²²⁹ Thus we could view $\leq_{\mathcal{B}}$ as a function that takes an individual, world and time argument, x , w , and t , and then yields those actions with the highest expected utility for x in w at t . "Expected utility," as per Van Rooy (2003), can be defined in terms of the utility function, U , and discrete probability function P . An action's expected utility, EU , takes the probability and utility of each outcome associated with the action, and sums them, as below.

$$(510) \quad EU(a) = \sum_w P(w) \times U(a, w)$$

Worlds →	u	v	w	
Actions ↓	$P(u)=1/3$	$P(v)=1/3$	$P(w)=1/3$	
s (walk to station)	$U(s,u)=3$	$U(s,v)=0$	$U(s,w)=3$	EU(s)=2
p (walk to palace)	$U(p,u)=0$	$U(p,v)=3$	$U(p,w)=3$	EU(p)=2

Table 8.9: Equal Probabilities, Equal Utility

Thus in a context where an agent wants to get an Italian newspaper, but thinks it's equally likely that (i) only the station sells them, (ii) only the palace sells them, or (iii) both the station and the palace sell them, the two actions (s =walk to the station, p =walk to the palace) have the same expected utility. In contexts where the agent thinks it's more likely that only the station sells them, on the other hand, the action s =walk to the station has a higher expected utility:

Worlds →	u	v	w	
Actions ↓	$P(u)=1/2$	$P(v)=1/4$	$P(w)=1/4$	
s (walk to station)	$U(s,u)=3$	$U(s,v)=0$	$U(s,w)=3$	EU(s)=2.25
p (walk to palace)	$U(p,u)=0$	$U(p,v)=3$	$U(p,w)=3$	EU(p)=1.5

Table 8.10: Unequal Probabilities, Equal Utility

It might also be the case that while the station is only a 1km walk away, the palace is a 10km walk away. In such a case (under the assumption that the goal is to get an Italian newspaper in the shortest amount of time), walking to the station has a higher utility than walking to the palace, and hence a higher expected utility than walking to the palace (assuming equal probabilities).²³⁰

The 'actions open to the agent' yielded by $\leq_{\mathcal{B}}(x,w,t)$ from $\mathcal{A}(x,w,t)$, can be defined as the actions in $\mathcal{A}(x,w,t)$ that have expected utilities higher than some contextually-specified number. This allows different people to have different opinions as to what the cut-off point for a good-enough utility is. I assume that the determination of how the utility function maps action-world pairs to utilities/real-numbers, and how the discrete probability function maps worlds to probabilities is

229. I avoid using Van Rooy (2003)'s way of referring to this, $\leq_{\mathcal{A}}$, because I have been using the symbol \mathcal{A} in a different way than Van Rooy (2003): he uses \mathcal{A} the way I use **Act**, to refer to a set of possible actions. I use \mathcal{A} as a conversational background - a function that takes an individual, world and time, x , w , and t , and yields the set of actions available to a particular individual in a particular world at a particular time.

230. Or it may be the case that the palace always charges more money for things than the station charges for them, and the goal is to get an Italian newspaper for the least amount of money.

Worlds →	u	v	w	
Actions ↓	$P(u)=1/3$	$P(v)=1/3$	$P(w)=1/3$	
s (walk to station)	$U(s,u)=3$	$U(s,v)=0$	$U(s,w)=3$	$EU(s)=2$
p (walk to palace)	$U(p,u)=0$	$U(p,v)=1$	$U(p,w)=1$	$EU(p)=2/3$

Table 8.11: Equal Probabilities, Unequal Utility

not a matter for linguistics, but rather a matter for psychology or philosophy. Knowledge of lexical denotations and the compositional semantics does not determine how an agent reasons; people that speak the same language reason in different ways, and assign different utilities to various actions and different probabilities to various worlds. Some people may even base their actions solely on the utility of the possible outcomes, not taking into account the probability of the outcomes. The determination of the sorts of actions an agent is willing/likely to take is something we take into account when we make inferences about the future. It is thus reflected in our grammatical expression of such inferences (i.e., circumstantial modal claims). The determination of these sorts of actions, however, is independent of the linguistic system.

Extensions of Decision Theory and Linguistics

There are many extensions of Decision Theory that allow for more complexity in terms of the factors we take into account when making decisions. Game Theory, for example, is a sub-branch/extension of Decision Theory that allows for multiple agents (players) with distinct goals, where the agents each choose actions to further their own goals. Outcomes cannot be treated as simple action-world pairs, $\langle a, w \rangle$, but involve n-tuples of actions for systems with n number of players/agents. Game Theory also allows for variability in the environment (i.e., the circumstances) to affect outcomes. In order to model this, the environment/circumstances is treated as an additional player, Chance, who makes their choices based on some sort of randomizing device (Resnik (1987)). As all of these complications are factors that we take into account when making a prediction about outcomes, all of these complications are factors that affect the meaning of the grammatical way we express these predictions. While I do not offer a concrete formalization of how to incorporate multi-agent systems and chance into the semantics of circumstantial modals, the incorporation of a single agent that I have presented in chapter 4 provides an analytical step towards achieving such a goal.

To summarize, in this section I have described Decision Theory and summarized Van Rooy (2003)'s incorporation of Decision Theory into a linguistic framework. I compared this to the incorporation of actions into circumstantial modality that I have proposed and concluded that the two approaches are not inconsistent with each other; they merely have different analytical goals: while Van Rooy (2003)'s analysis is situated within a movement to use actions/Decision Theory to explain conversational/pragmatic phenomena at the sentential level, my analysis uses actions/Decision Theory with the aim of accounting for interactions between sub-sentential elements like tense, aspect and modals. The discussed connections between Decision Theory and the

theory proposed here (i.e., the incorporation of actions into a semantics for circumstantial modals) thus represents a bridge between the dynamic semantic approaches normally used to treat conversational/pragmatic phenomena and the static approaches normally used to treat sub-sentential phenomena.

8.2.2 Portner (2007)'s Imperatives

Another linguistic work that incorporates actions into a semantic analysis is Portner (2007). Portner (2007) aims to formalize the intuition that the meaning of deontic modal claims like (511a) and the meaning of imperatives like (511b) are related.

- (511) a. You should finish your peas. DEONTIC MODAL CLAIM
b. Finish your peas! IMPERATIVE

Portner (2007) proposes that just as declaratives involve a proposal to update the Common Ground, imperatives involve a proposal to update the Addressee's To-Do-List. I briefly discussed Portner (2007)'s To-Do-List in chapter 1, where I focussed on the similarities between the Common Ground and To-Do-List in that these are both contextually-salient discourse sets that are updated throughout a conversation. I abstracted away from differences between these sets, however, by referring to both the Common Ground and To-Do-List as sets of propositions. The details of Portner (2007)'s proposal, however, are such that the To-Do-List is not a set of propositions, but rather a set of properties (where a property is of type $\langle e, \langle s, t \rangle \rangle$) that typically correspond to the set of **ACTIONS** an individual is committed to. The similarity between deontic modals and imperatives then follows from an analysis where the To-Do-List is a subset of the deontic ordering source used to restrict the meaning of deontic modal claims like (511a).

Like the Decision-Theoretic approaches, the analysis that Portner (2007) presents is one that involves actions, but unlike the action-dependent framework I have presented in this dissertation, actions are incorporated into a dynamic framework which abstracts away from subsentential phenomena like tense and aspect. On the other hand, Portner (2007)'s range of empirical data includes imperatives and deontic modality, an interesting area of investigation that I have not attempted to incorporate into my action-dependent framework. Further, the particular way that Portner (2007) accounts for similarities between imperatives and deontic modality provides a bridge between the semantics of different clause-types. While this is not something that my action-dependent framework (in its current instantiation) purports to account for, there are clear temporal similarities between imperatives/deontic modals and the circumstantial modals that I have addressed. I return to this issue when discussing future areas of research in section 8.5.

To summarize to this point, the incorporation of actions into a formal semantic theory has empirical range beyond what I have presented here in this dissertation. Van Rooy (2003) and Portner

(2007) are two representatives that showcase this claim. The details of their particular analyses are additionally interesting to consider, as they show how the action-dependent framework that I have presented here can be extended to account for interactions with dynamic phenomena like questions and imperatives. These approaches, however, are similar in that unlike the action-dependent approach I have presented here, they abstract away from sub-sentential phenomena. In the next section, I discuss Force-Dynamic approaches to agentivity and causation, which introduce the notion of a **FORCE** which plays much the same role as the **ACTIONS** I propose. Unlike the previously described approaches, Force-Dynamic approaches deal primarily with sub-sentential phenomena.

8.2.3 Force-Dynamic Approaches

The incorporation of actions into the semantic ontology provides not only a bridge to mathematical/philosophical/ logical frameworks like Decision Theory, but also toward cognitive approaches to linguistics like Talmy (2000). One of the major semantic properties that this dissertation deals with is the notion of what it means to be dynamic - i.e., what it means to involve change. While I adopted a branching-times STIT-based formalization of dynamicity/change - i.e., the postulation of a positive and negative condition in v_{stit} and v_{CAUSE} , Talmy (2000) presents a force-dynamic framework to model similar phenomena like causation, agency and volition, as well as their interaction with aspectual and modal elements. Although Talmy (2000)'s particular formalization of force-dynamics is very different from the standard λ -based compositional semantics I assume, Copley & Harley (2011) represents an attempt to incorporate something like Talmy (2000)'s force-dynamics into a generative approach. In this section, I summarize Copley & Harley (2011)'s take on force-dynamics, and then compare it to the action/STIT-approach I have proposed.

Copley & Harley (2011)'s Force-Theoretic Approach

The basic innovation that Copley & Harley (2011) make to the standard λ -based compositional semantics is to reframe the notion of an event as a **FORCE**, which they treat as a function from situations to situations. They argue that this allows for a more streamlined syntax-semantics interface, a clear delineation between stage-level stative predicates and eventives, and intuitively-appealing analyses of phenomena like the progressive and non-culminating accomplishments.

Copley & Harley (2011) begin with a survey of how the notion of an 'event' has played a role in generative linguistics. They begin with Davidson (1967)'s approach, where an event is treated like an individual based on the observation that an event has observable properties, has a spatio-temporal location, and can be referenced by a pronoun. Verbs are treated as taking an event argument, in addition to individual arguments. The majority of linguistic literature using the notion of event identifies the VP as denoting a predicate of events. Following Kratzer (1996), higher syntactic elements like the vP/VoiceP introduce their own event argument which is then identified with the VP-event via a new composition rule called 'Event Identification.' Copley & Harley (2011)

also refer to research that focuses on the internal structure of these events (e.g., Pustejovsky (1995), Higginbotham (2000), Ramchand (2008)). These approaches posit the existence of subevents, e.g., e_1 , a causing subevent, and e_2 , a result subevent, where these subevents are causally linked, as opposed to being identified.

Copley & Harley (2011) point out that there are empirical and conceptual problems with these uses of events in linguistics. First, they point out that the postulation of a new composition rule like Event Identification conceptually complicates the compositional semantics. Second, they note that these approaches don't allow for a clear delineation between stage-level stative predicates like "be hungry" and eventives, despite clear empirical evidence that aspectual modifiers treat these as distinct kinds of elements. Thirdly, they point out that the causal chaining of causing and result subevents has difficulty accounting for non-culminating events. They propose that their force-theoretic approach to events avoids the problem of postulating a new compositional rule and gives a simple account of non-culminating events.

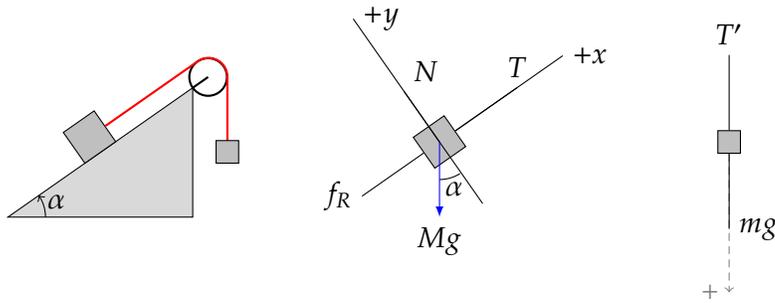
The Formal Components

Situations and Forces Copley & Harley (2011) define situations (type s) as a collection of individuals and their properties. Stative predicates are predicates of situations (type $\langle s, t \rangle$). Eventive predicates, on the other hand, are predicates of forces, where forces are formalized as functions from situations to situations (type $\langle s, s \rangle$). An eventive predicate is thus of type $\langle \langle s, s \rangle, t \rangle$.

Intuitively, a force is an input of energy into some initial situation that leads towards a final situation. Multiple forces may apply to the initial situation, however: the final situation depends on the net force of all the forces acting on the initial situation, much the same way the net force acting on an object is calculated via free body diagrams as in (512). That is, a linguistic force, like the notion of a force from physics, is assumed to be a vector, having both magnitude and direction (from an initial situation to a final situation). The magnitude of forces with the same direction are added, the magnitude of forces with opposite directions are subtracted.²³¹

231. These diagrams were taken from TeXample.net, Free Body Diagrams, Fauske (2008)

(512) Free Body Diagrams



Copley & Harley (2011) propose that the grammar refers to this notion of a net force. This can be formalized into the following grammatical components: Given a force, f , the net force, initial and final situation are posited as below.

(513) a. **NET FORCE**

$\text{net}(s) =:$

The net force of s , if s has a net force

Undefined, if s has no net force.

b. **INITIAL SITUATION**

$\text{init}(f) = \text{net}^{-1}(f)$

The initial situation of f is the situation, s ,

of which f is a net force.

c. **FINAL SITUATION**

$\text{fin}(f) = f(s) = f(\text{net}^{-1}(f))$

The final situation of f is the situation that results

when f takes s as its argument.

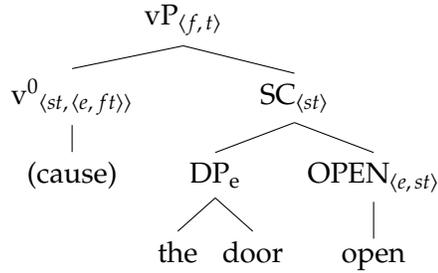
These operators form the core semantics of various flavours of little v (cf. Folli & Harley (2005)), which apply to (stative) result situations (e.g., v_{become} , v_{cause}), or to predicates of forces (v_{do}). Examples of these versions of little v , along with how they combine with a VP, are given below in (514).²³²

(514) Versions of little v that can combine with the SC via FA

- a. **UNACCUSATIVE:** The door opened.

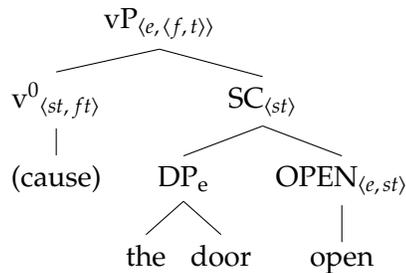
232. The letter f is used as shorthand for $\langle s, s \rangle$, the type of a force. Variables over predicates of forces (type $\langle f, t \rangle$) will be represented by lowercase Greek letters, e.g., π, ρ , etc. And variables over predicates of situations (type $\langle s, t \rangle$) are represented with lowercase Roman letters, e.g., p, q , etc.

$$\llbracket v_{\text{become}} \rrbracket^{\text{h,c}} = \lambda p. \lambda f. \neg p(\text{init}(f)) \& p(\text{fin}(f))$$



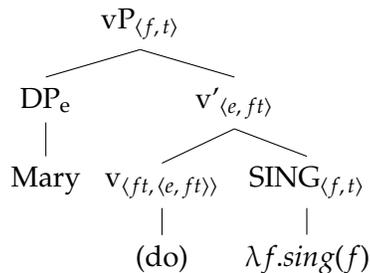
b. ACCOMPLISHMENT: (The wind) opened the door.

$$\llbracket v_{\text{cause}} \rrbracket^{\text{h,c}} \lambda p. \lambda x. \lambda f. \neg p(\text{init}(f)) \& p(\text{fin}(f)) \& \text{SOURCE}(x, f)$$



c. ACTIVITY: Mary sang.

$$\llbracket v_{\text{do}} \rrbracket^{\text{h,c}} = \lambda \pi \in D_{\langle f, t \rangle} \lambda x. \lambda f. \pi(f) \& \text{SOURCE}(x, f)$$



Observe that given the force-theoretic denotations for v_{become} , v_{cause} and v_{do} no special composition rule is required; they combine with the VP via function application.

Kinds of Forces: The Normal Field, Volitions and Agency Net force is not the only kind of force that the grammar refers to. As an example of a force (beyond net force) that the grammar makes reference to, Copley & Harley (2011) posit the existence of what they call the **NORMAL FIELD**. This is a collection of forces that encode basic or general tendencies - i.e., the tendency for heavy things to fall, for light things to rise, for fruit to ripen, and for shoplifters to be arrested. The normal field thus encompasses forces that come from general laws, whether physical, social or psychological. Although the particular data that Copley & Harley (2011) consider do not require direct reference to the normal field, they note that it must be taken into account when calculating the net force on

an initial situation, and suggest that various linguistic phenomena that call on “what is normal” (like a stereotypical ordering source) would, in their system, refer to the normal field.

In addition to concrete forces - e.g., objects and fields, which exert forces on other objects, Copley & Harley (2011) also consider more abstract forces - i.e., an individual’s volition and agency. They note that Copley (2010) treats intentions as (psychological) forces with an intensional component - i.e., they are functions from situations to properties of situations (or forces) - i.e., $\langle s, \langle s, t \rangle \rangle$ or $\langle s, \langle \langle s, s \rangle, t \rangle \rangle$. These interact with the world via agency, which is treated as an interaction between intentions and particular tendencies within the **NORMAL FIELD**. The normal field exerts a force on rational individuals so that they follow the Law of Rational Action, described below (cf. Smith (1988), Portner (1997)).

(515) The Law of Rational Action (Copley & Harley, 2011, pp. 16-17)
If a volitional entity intends something in a situation, *s*, and is not prevented by anything from acting in such a way (acc. to his/her beliefs) as to achieve it, the being (exerts a force on *s*) acts in such a way (acc. to his/her beliefs) to achieve it.

The Law of Rational Action (via the normal field) thus translates psychological forces like intentions and commitments into real-world forces that must be taken into account when calculating the net force of a situation. Copley & Harley (2011) also point out that the difference between intentional and non-intentional action is often lexically encoded - e.g., the difference between *murder* and *kill*. This suggests that the grammar can also make direct reference to psychological forces like intentions and commitments.

Efficaciousness Recall the three problems with event-semantics that Copley & Harley (2011) aim to amend with their Force-Theoretic framework. First, they provide a type-theoretic difference between stage-level stative predicates and eventives: while statives (stage-level and individual-level) are predicates of situations, eventives are predicates of forces - i.e., predicates of functions from situations to situations. Second, they avoid postulating a new composition rule like Event Identification by treating the various flavours of little *v* as elements that take predicates of situations, or predicates of forces, as their arguments. This allows the various flavours of little *v* to combine with the VP via function application, nullifying the need for a rule like Event Identification. The third problem they address is the issue of non-culminating events.

Non-culminating events represent a cross-linguistically robust empirical phenomenon whereby verbs that appear to be the semantic equivalent of English accomplishments (e.g., write a book, eat a chicken) do not pattern like English accomplishments in terms of whether they entail the truth of their result state (e.g., having written an entire book, having eaten an entire chicken). This sort of phenomenon has been documented for Austronesian languages like Malagasy (Travis (2000)) and Tagalog (Schachter & Otnes (1983), Dell (1983)), Salish languages like St’át’imcets

and *Skwxwú7mesh* (Bar-El et al. (2004), Bar-el (2005), Kiyota (2008)), Thai (Koenig & Muansuwan (2000)), Central Pomo, Dyirbal, Icelandic, Irish, Southern Tiwa, Japanese and Lakhota (Ritter & Rosen (2000)). While the result state is strongly implied or implicated, the implication/implicature can always be cancelled. Copley & Harley (2011) point out that this phenomenon is problematic for the subevent-approach to event composition, where causing and result-state subevents are linked via a causation relation.

But how does Copley & Harley (2011)'s force-theoretic approach avoid this problem? If a force is a function from an initial situation to a final situation, how can we account for variation in terms of whether the final situation obtains? Recall that the initial situation of a force, f , is the situation, s , of which f is a net force. Copley & Harley (2011) propose that the issue of whether or not the expected result state obtains is an issue in terms of the speaker properly identifying the initial situation. This can be illustrated with the diagram in figure 8.1; while the speaker may think that s_0 is the initial situation, there is actually a larger situation, s_0' , which determines what the final situation is.

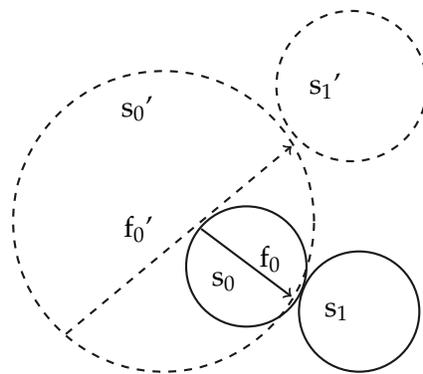


Figure 8.1: Larger Situation has a Different Successor Situation

Because the identification of s_0 is subject to epistemic variability, so is the identification of s_0' 's net force. This correlates to several different potential outcomes. Copley & Harley (2011) formally encode this notion of whether a situation is the correct s_0 or not, as follows:

(516) A situation s_0 is **EFFICACIOUS** just in case its normal ceteris paribus result actually obtains.
That is,

- (i) for any s_0 that has a net force f_0 , then s_0 is efficacious iff $\text{fin}(f_0)$ actually obtains.
- (ii) For any s_0 that has no net force, no successor is defined. And so s_0 is efficacious if it persists in time.

The difference between accomplishments like those like English, which entail the truth of their result state, versus accomplishments like those in Malagasy, Thai, *Skwxwú7mesh* etc., is that while the former presuppose that their initial situation is efficacious, the latter lack this presupposition.

Summary To summarize, Copley & Harley (2011)'s force-theoretic framework reframes an 'event' as a force, where a force is formalized as a function from situations to situations. Flavours of little *v* place restrictions on the properties that hold of the various situations associated with such a function - i.e., a force's initial state, its final state, etc., and the VP provides a predicate of situations that can be identified with these initial/final states. The grammar is posited to make reference to the 'net force' of a situation, where the component forces making up the 'net force' can consist of the basic, physical forces that objects exert on various other objects (e.g., objects contained within the initial situation), but also more abstract forces such as general laws and tendencies, encoded in what Copley & Harley (2011) term the **NORMAL FIELD**, and intentions, which are treated as (psychological) forces with an intentional component. Agency is treated as an interaction between intentions and the normal field. The 'net force' of a situation applies to that initial situation, and yields the final situation - i.e., the result state. The appearance of forces that do not yield their expected results (i.e., non-culminating accomplishments) are an issue of the speaker not correctly identifying the initial situation (and hence not correctly calculating the net force). Copley & Harley (2011) argue that their force-theoretic framework is preferable to the standard approaches to events in generative grammar in that (i) no extra compositional rules like Event Identification are required, (ii) the empirical difference between stage-level stative predicates and eventives is formally encoded in terms of type, and (iii) non-culminating accomplishments can be accounted for without reference to modality.

Comparison: Forces and Actions

There are many points where Copley & Harley (2011)'s force-theoretic approach, and the action-dependent approach that I propose seem to parallel each other, although there is not a clear 1:1 mapping between the approaches. In this section I identify these various points of connection, and compare/contrast the two approaches.

Copley & Harley (2011) propose to incorporate forces into the semantic ontology, where a force is a function from an initial situation to an output situation. In contrast, I have proposed that actions are moves that an agent can make, to take you from an initial situation to an output situation. These notions of action and force are very similar; where my notion of action differs from Copley & Harley (2011)'s notion of force is in how their connection to events is formalized. While Copley & Harley (2011) propose to replace the notion of an event with their notion of a force, I propose to maintain the standard event-as-an-individual approach and relate actions to events via a kind-instantiation relation.

Given my Chierchia (1998)-inspired actions-as-kinds approach, my notion of action also has a possible doppelgänger in Copley & Harley (2011)'s intensional notion of an intention/commitment. Although I have been treating actions as simple primitives in the ontology, and not complex intensional elements, this was a simplification chosen to avoid unnecessary complications given the

range of data I was aiming to account for. Chierchia (1998), however, formalizes individual kinds as intensional functions - i.e., functions from worlds to the instantiations of that kind in those worlds. If I mean to treat actions as event-kinds, parallel to individual-kinds, then actions should be intensional functions - i.e., functions from worlds to instantiations of the action in those worlds. Formally, then, my notion of action parallels Copley & Harley (2011)'s notion of an intention - both are functions from worlds to instantiations in those worlds. My notion of an action does not conceptually parallel their notion of an intention, however. Intentions are psychological actions (psychological forces, in their terms) in their framework - i.e., they are mental events in the sense of Brand (1979). The notion of actions that I have in mind involves both a mental and physical component - e.g., a blowing action involves both mental activation (or the activation of the agent's neurological pathways), as well as the physical movements involved with blowing, such as the relaxation of the diaphragm and lip-rounding.

An obvious similarity between Copley & Harley (2011)'s approach, and the action-dependent approach that I propose, is the postulation of denotations that correlate to Dowty (1979)'s lexical DO and CAUSE operators, where Copley & Harley (2011)'s operators incorporate reference to forces (and predicates of forces), and my operators incorporate reference to actions. As is the case with the previous comparison (to Decision Theory), the action-dependent approach that I have taken differs from Copley & Harley (2011) in that I have explicitly connected the notion of an action to the temporal domain via the action's instantiation as an event and Krifka (1989)'s temporal trace function. My framework thus allows a denotation to directly refer to the runtime of an event instantiating an action. Making reference to the runtime of an event when it is formalized as a force, however, is less straightforward. Recall that an event/force is formalized as a *function* from situations to situations, as opposed to being formalized as a particular/individual-like element. Something like Krifka (1989)'s temporal trace function, which applies to particulars, thus cannot yield the runtime of an event. It is not impossible for Copley & Harley (2011)'s approach to indirectly refer to the runtime of an event, however. Copley & Harley (2011)'s framework includes *init* and *fin* functions, which apply to forces and yield situations. The runtime of an event could plausibly be indirectly measured by taking the temporal trace of the initial and final situations, and calculating the difference.²³³

233. I discuss this issue of whether or not the runtime of the event, $\tau(e)$, can be referred to under the assumption that aspects like perfect, perfective and imperfective make reference to $\tau(e)$. It is not clear, however, whether Copley & Harley (2011) require reference to $\tau(e)$. For instance, they posit the denotations in (i) for aspects in O'odham, which do not make reference to $\tau(e)$. Note that the λs_0 argument refers to a topic situation, which they propose is provided by tense.

- (i) a. $\llbracket \text{PROSP} \rrbracket^{h,c} = \lambda \pi. \lambda s_0. \exists n : \pi(\text{net}(\text{succ}^n(s_0)))$
 b. $\llbracket \text{IMPF} \rrbracket^{h,c} = \lambda \pi. \lambda s_0. \pi(\text{net}(s_0))$
 c. $\llbracket \text{PFV} \rrbracket^{h,c} = \lambda \pi. \lambda s_0. \pi(\text{net}(s_{-1}))$
 (Result state of some force holds as of the topic time)

Note that these sorts of denotations would not be useful for analysing the Blackfoot aspects, as they would not allow for stacked/multiple aspects, or aspects applying to modal claims, and it is unclear how one could differentiate between the perfective denotation they give, and a denotation for a perfect. While there may be no perfect/perfective contrast in

To summarize, the approach that I present has many parallels to the approach presented by Copley & Harley (2011). The approach I have presented, however, is more tightly linked to the temporal system. This is unsurprising given our different empirical goals. My approach also maintains the existence of events-as-individuals, in addition to the notion of an action, while Copley & Harley (2011)'s approach replace the notion of an event with their notion of a force. While their approach is more conceptually minimal, I believe that Davidson (1967)'s original empirical observations about parallels between events and individuals - i.e., the observation that they have observable properties, spatio-temporal locations, and can be referenced by a pronoun - remain compelling reasons to maintain existence of events as individuals in the ontology.

A final thing to note is that one conceptual asset that Copley & Harley (2011)'s approach has, which the approach presented in this dissertation does not, is a tightly-linked syntax-semantics interface. Note, however, that the core concepts behind the framework I have adopted do not necessitate a divide between the syntax and semantics - i.e., there is no conceptual reason why a language cannot have a piece of morphology correlating to the v_{stit} operator which is systematically combined with result states via the syntax. The given denotations for the eventive v_{stit} and v_{CAUS} operators, like Copley & Harley (2011)'s similar operators, can combine with properties via function application. The reason why I have not posited this type of system for Blackfoot is only that I lack independent evidence that the lexical operators I have proposed correlate with specific morphosyntactic structure. In chapter 4 I suggested that these operators may correlate with the final portion of the [initial-(media)-final] verb stem template, but did not make any claim regarding this issue as it does not affect any of my semantic claims. Note, however, that Armoskaite (2011), looking at selectional restrictions between initials and finals in Blackfoot, concludes that morphosyntactic category (e.g., noun vs verb), transitivity and sensitivity to animacy are all grammatical features of Blackfoot roots that cannot be syntactically constructed, but must be lexically encoded.²³⁴ If these sorts of morphosyntactic features must be lexically encoded in the verb root/initial, it is not impossible that the semantic features associated with the v_{stit} and v_{cause} operator may similarly be lexically encoded as such.

8.3 Blackfoot's Syntax-Semantics Interface

If the particular operators that I have proposed do not correlate with morphosyntactic structure, how *does* the proposal relate to Blackfoot morphosyntax? In this section I discuss how the action-dependent semantics for tense, aspect and modality that I have proposed for Blackfoot can be

O'odham (wherein the issue would be irrelevant), the empirical contrast between perfective and perfect predicates in Blackfoot would make adopting Copley & Harley (2011)'s approach to aspects problematic.

234. citearmoskaite2011destiny contrasts Blackfoot with Lithuanian on this point, as Lithuanian contains both category-neutral roots and roots where category is lexically encoded.

viewed with respect to Blackfoot’s syntactic structure. More specifically, I address how the assumptions and analyses presented in the main body of the dissertation are, or are not, compatible with previous proposals regarding Blackfoot’s syntactic structure. I first address Ritter & Wiltschko (2005, 2009)’s Person/Participant-based syntactic spine for Blackfoot. This is situated within the Universal Spine Hypothesis (Wiltschko (2014), Wiltschko & Déchaine (2009)). I then discuss Bliss (2013), which is similarly situated within Ritter & Wiltschko (2005, 2009)’s Person/Participant-based approach to Blackfoot.

8.3.1 The USP and Person-Based Functional Categories

Minimalist and Cartographic approaches to syntax represent extreme ends of a spectrum regarding how much syntactic structure is pre-specified by a UG-given universal spine of functional categories. Cartographic approaches (cf. Cinque (2002), Rizzi (1997)) propose that there is a large pre-specified functional structure, each head in the structure correlating with a specific kind of semantic meaning. Thus something like an imperfective aspect is associated with a fixed syntactic position across different languages. A Chomsky (1995)-style Minimalist (e.g. Bare Phrase Structure) approach, on the other hand, does away with functional categories and hence assumes no pre-specified functional structure. The Universal Spine Hypothesis of Wiltschko & Déchaine (2009) and Wiltschko (2014) represents an intermediate position between these two extremes: it assumes the existence of universal categories that map onto a pre-specified universal spine, but (i) the number of categories is smaller, as they allow for modifiers, and (ii) the categories are (partially) dissociated from specific semantic meanings. The universal spine is present in both the clausal and nominal domain; these parallel domains are represented on the left and right respectively:

(517) The Universal Spine Hypothesis



1. **CP/KP:** Linking
2. **IP/DP:** Anchoring
3. **AspP/phiP:** Viewpoint
4. **vP/nP:** Classification

There are four major functional categories: Linking categories CP and KP, anchoring categories IP and DP, viewpoint categories AspP and ϕ P, and classification categories vP and nP. Each of these categories is associated with a particular, but underspecified syntactic/semantic function. Different languages vary in the sort of lexical content that combines with these functional categories in order to make them fully specified semantically. For instance, we can think of the Viewpoint category AspP as always associated with the function of encoding a relationship between the VP event and a reference event, and the Anchoring category IP as always associated with the function of encoding a relationship between the aforementioned reference event and the utterance event. In English the lexical/semantic content associated with these functional categories is temporal: The content of Infl is Tense, encoding a relationship of coincidence (present) or non-coincidence (past) between the time of the reference event and the time of the utterance event. The content of AspP is grammatical/viewpoint aspect, which encodes a relationship between the time of the reference event and the VP event: RT containing ET (perfective) or ET containing RT (imperfective). This is schematized by the formulas in (518).²³⁵

(518) English Temporal Instantiations of IP

$$\text{Infl} = \lambda F. \lambda R. R(F(e_{\text{Utt}}), F(e_{\text{Ref}}))$$

(Where F represents a variable over the lexical content of Infl)

$$\text{Tense} = \lambda R. R(\tau(e_{\text{Utt}}), \tau(e_{\text{Ref}})) \quad \tau: \text{temporal trace function}$$

1. Present = COIN($\tau(e_{\text{Utt}}), \tau(e_{\text{Ref}})$) ($\tau(e_{\text{Utt}}) \circ \tau(e_{\text{Ref}})$)
2. Past = \neg COIN($\tau(e_{\text{Utt}}), \tau(e_{\text{Ref}})$)

In Blackfoot, by contrast, the lexical/semantic content associated with these functional categories is not temporal (Ritter & Wiltschko (2005, 2009), Bliss (2005, 2013), Ritter (2014)). Rather, Blackfoot instantiates these categories via participant or person-related lexical content. The content of Infl is Person, encoding a relationship of coincidence between the participants of the reference event and the participants of the utterance event (Ritter & Wiltschko (2009)).²³⁶ The content of AspP is Point-of-View, encoding a relationship between the event participants and a point-of-view holder (Bliss (2005, 2013)).²³⁷ Thus whereas tense and aspect map onto specific functional categories and hence syntactic positions in English, they need not map onto those specific functional categories and syntactic positions in Blackfoot.

235. Note that the formulas provided in (518) represent my interpretation of Wiltschko & Déchaine (2009)'s prose explanation regarding the division between the functional and lexical content of a grammatical category, as they do not provide explicit denotations.

236. Ritter & Wiltschko (2009) propose that PersonP is headed by the independent markers *hp-* (local) and *-m/Ø* (non-local). Bliss (2013) proposes that the person prefixes *nit-/kit-/ot-* sit in the specifier position of PersonP.

237. Bliss (2005, 2013) proposes that AspP is headed by the direct/inverse theme markers.

(519) Blackfoot Participant Instantiations of IP

$$\text{Infl} = \lambda F. \lambda R. R(F(e_{\text{Utt}}), F(e_{\text{Ref}}))$$

(Where F represents a variable over the lexical content of Infl)

$$\text{Person} = \lambda R. R(\pi(e_{\text{Utt}}), \pi(e_{\text{Ref}}))$$

π : participant trace function

1. Local (1/2) = $\text{COIN}(\pi(e_{\text{Utt}}), \pi(e_{\text{Ref}}))$
2. Non-Local((3) = $\neg \text{COIN}(\pi(e_{\text{Utt}}), \pi(e_{\text{Ref}}))$

Person-Based Blackfoot and the Action-Dependent Framework

The basic assumptions I make regarding Blackfoot tense, aspect and modality are incompatible with a cartographic approach where the meaning of a morpheme dictates its syntactic position in a universal spine. It is compatible with either a minimalist Bare Phrase Structure approach, or the Person/Participant-based Universal Spine Hypothesis approach. Based on their morphological distribution (i.e., the fact that they can co-occur in various linear orders, and their position to the left of the verb stem), I proposed that all of the aspects and modals are modifiers - i.e., they need not map onto a specific syntactic position in the spine.²³⁸ This fits in with a system where there is no pre-specified functional spine, or with a system where the pre-specified functional spine is not instantiated with tense and aspect.

8.3.2 Bliss (2013): Blackfoot Argument Structure

In the previous section I discussed how the assumptions I make about Blackfoot's aspectual/modal morphemes are consistent with proposals regarding Blackfoot's syntactic structure. But what about the assumptions I have made regarding individual arguments and person/clause-type morphology? Consider, for example, what I have assumed regarding the subject/agent of a Blackfoot sentence: while I assume that the position associated with the agent/"external argument" is introduced by the verb stem (which merges at the very beginning of the syntactic derivation), I leave the satisfaction of this argument to a very late point in the derivation - crucially, the satisfaction of the agent argument must wait until after the aspectual and modal morphemes of interest (e.g., *ohkott-*, *áak-*, *aahkama'p-*) have merged. This is incompatible with popular approaches to external arguments like the VP-internal subject hypothesis, or approaches where the external argument is introduced by a higher functional head like little *v*. In this section, I will discuss Bliss (2013)'s syntactic take on Blackfoot person agreement and argument structure, and discuss whether or not it can be reconciled with the semantic system I have proposed.

238. In the system I adopt, tense always merges last (with respect to other modal/aspectual elements). This is not due to a syntactic restriction, however, but rather its semantic type: I assume that tense in Blackfoot denotes a variable of type *i*, which means that it saturates the temporal argument, yielding something of the wrong type for further aspectual/modal modifiers to apply to.

Bliss (2013)'s Functional Structure

Bliss (2013) presents an analysis of Blackfoot argument structure, looking at both the internal and external syntax of Blackfoot arguments, mapping these to the overtly visible morphosyntax associated with a Blackfoot clause. Her main claim is that the configurational/non-configurational distinction is not a primitive, and that the apparent non-configurationality represented in Blackfoot arises due to interactions among the elements of Blackfoot's argument-typing system, where argument-typing refers to the way that linguistic elements (like overt NPs, demonstratives, verbal morphology) are associated to the arguments of the verb stem. As outlined in chapter 2, Blackfoot has a variety of overt grammatical person/argument-marking elements. The ones I discuss here are as follows: the person prefixes/pro-clitics (*nit-*, *kit-*, *ot-*), verb finals, theme markers (direct/inverse suffixes), number suffixes and overt nominal expressions.²³⁹ Recall that except for the overt nominal expressions, these grammatical elements can be found in the verbal complex as follows: the person prefixes/proclitics appear at the very left edge of the verbal complex; verb finals form a part of the verb stem. The verb finals reflect whether or not the verb stem is transitive or intransitive, and whether the arguments are animate or inanimate (AI, II, VAI, VTI). To the right of the verb stem are the theme suffixes, also known in traditional Algonquianist terminology as direct/inverse suffixes. These occur only with transitive verb stems and reflect the person (1st, 2nd, 3rd proximate and 3rd obviative) of the arguments involved. If a 1st or 2nd person argument is plural, plural suffixes appear in the AGR 1 slot in the morphological template (these will not be addressed). To the right of these are the number suffixes associated with third person arguments; the morphemes that appear in this slot (AGR 2) also reflect the proximate/obviative status of the third person arguments.²⁴⁰

(520) Morphological Template for the INDEPENDENT

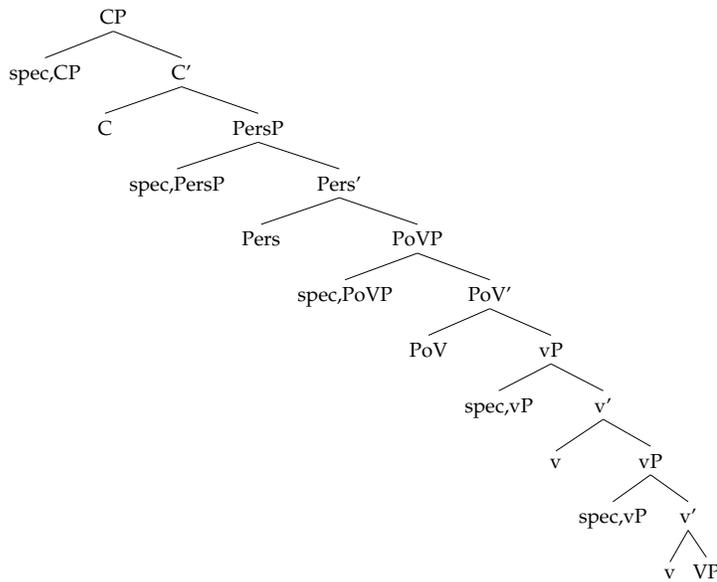
person prefixes-(preverbs)-[initial-(medial)-final]_{STEM}-(TH)-(AGR1)-AGR2

Bliss (2013) proposes that the relevant person/argument morphology pieces are situated in the syntactic spine illustrated in (521); in what follows I discuss each part of the functional structure she proposes, beginning with the verb root. I will not discuss her empirical motivation for the structure; please consult Bliss (2013) for details.

239. Bliss (2013) also discusses the internal syntax of the overt nominal expressions and the syntax of Blackfoot demonstratives. I will not address these here as her analyses for these are not directly relevant to the issue at hand - i.e., the satisfaction of argument positions introduced by the verb stem.

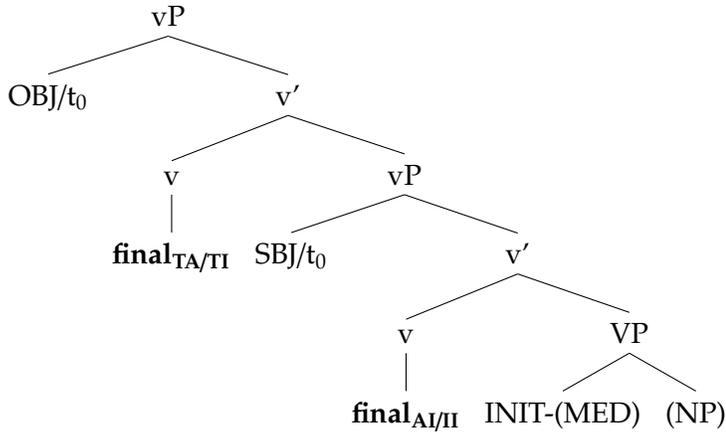
240. Enclitic pronouns can attach at the very right-edge of verbal template. See Bliss (2013) for more discussion of these.

(521) Blackfoot Functional Structure



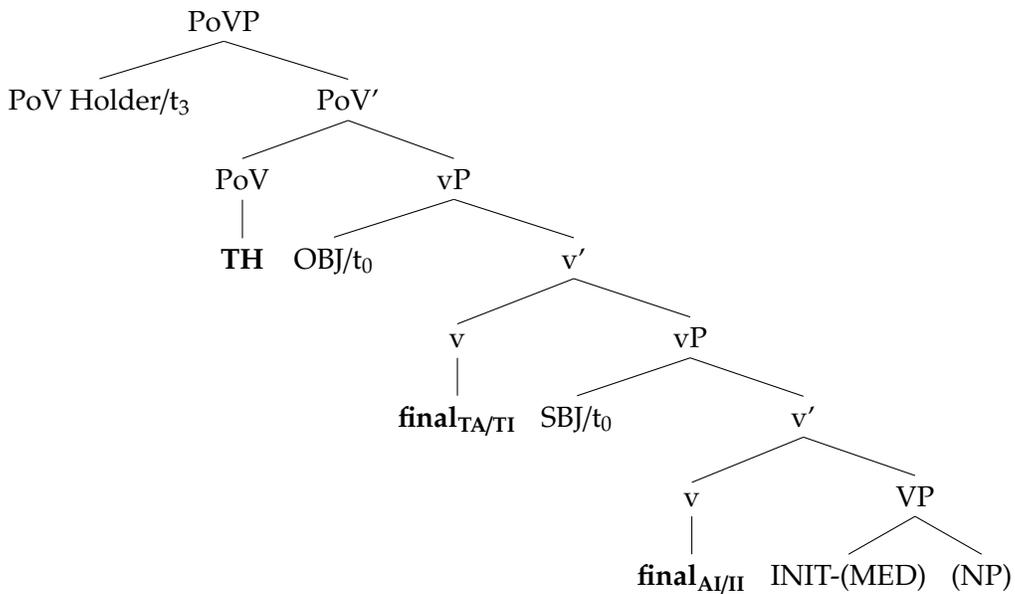
The verb root (consisting of an initial and optional medial element), can take an internal argument; however these arguments are never indexed by the verbal morphology - these correlate with the 'objects' of morphologically intransitive verbs. Morphologically transitive verbs involve a recursive vP structure. As shown in the tree above, there are two vP layers; finals associated with the transitive verbs (TA and TI verbs) are located in the head of the higher vP, and the finals associated with intransitive verbs (AI and II verbs) are located in the head of the lower vP. The finals are associated with uninterpretable (in)animacy features: the inanimate finals (TI and II) are associated with an uninterpretable [μ INAN] feature, while the animate finals (TA, AI) are associated with an uninterpretable [μ ANIM] feature. Both heads attract nominal elements with the relevant feature ([INAN] or [ANIM]) to their respected specifiers for checking via AGREE. In cases where the nominal element correlates with an obviative argument, the nominal element is an actual NP/DP. In cases where the nominal element correlates with a proximate argument, the nominal element is *pro_i*, which may or may not be coindexed with an overt DP.

(522) [initial-(medial)-**final**]_{STEM}



Bliss (2013) locates the direct/inverse theme (*a-_{DIR}*, *ok-_{INV}*) suffixes in the head of PoVP, which is Blackfoot's functional equivalent of (outer) AspP. The head of PoVP has an uninterpretable sentence feature, [*uSent*], which triggers movement of either the subject or object (both located in specifiers of lower vPs) to check that feature. If the subject moves, a direct theme marker results; if the object moves, an inverse theme marker results.

(523) [initial-(medial)-final]_{STEM-TH}

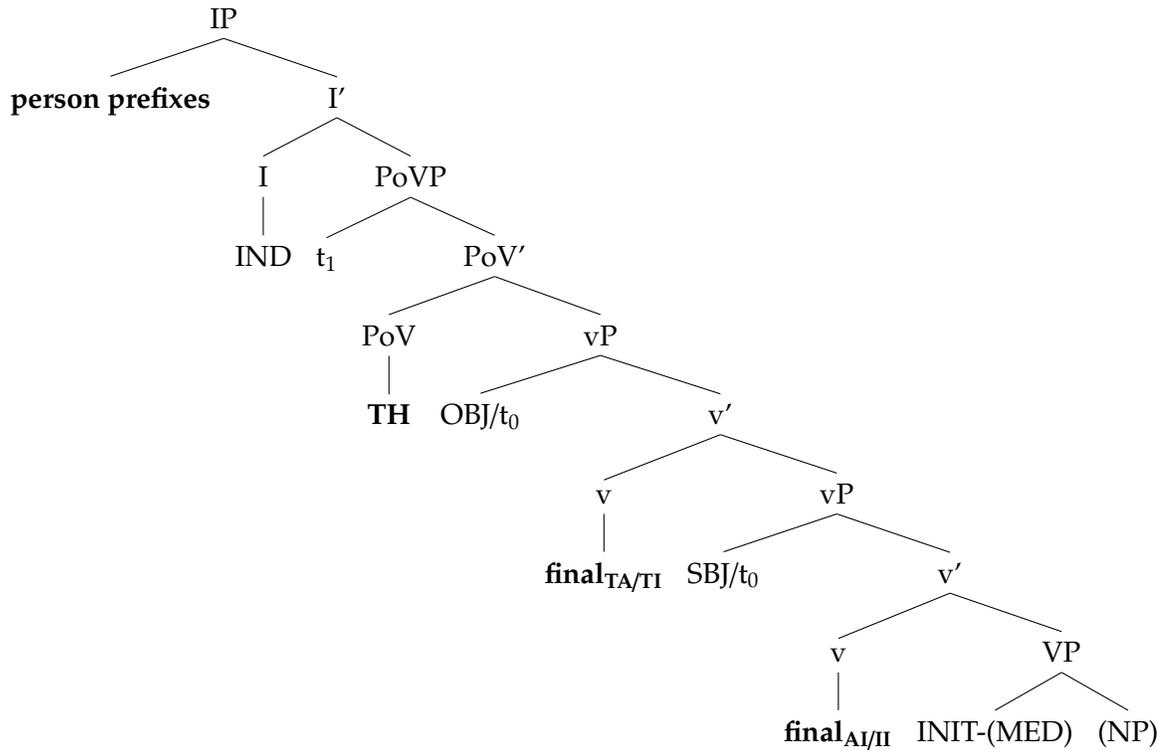


The head of Infl/Person is associated with an uninterpretable person feature [*uPers*]. Unlike the previous functional heads, these do not trigger the movement of lower arguments: the person prefixes (*nit-_{1st}*, *kit-_{2nd}*, *0/ot-_{3rd}*) merge directly into the specifier of Infl/PersonP to check this feature.

241

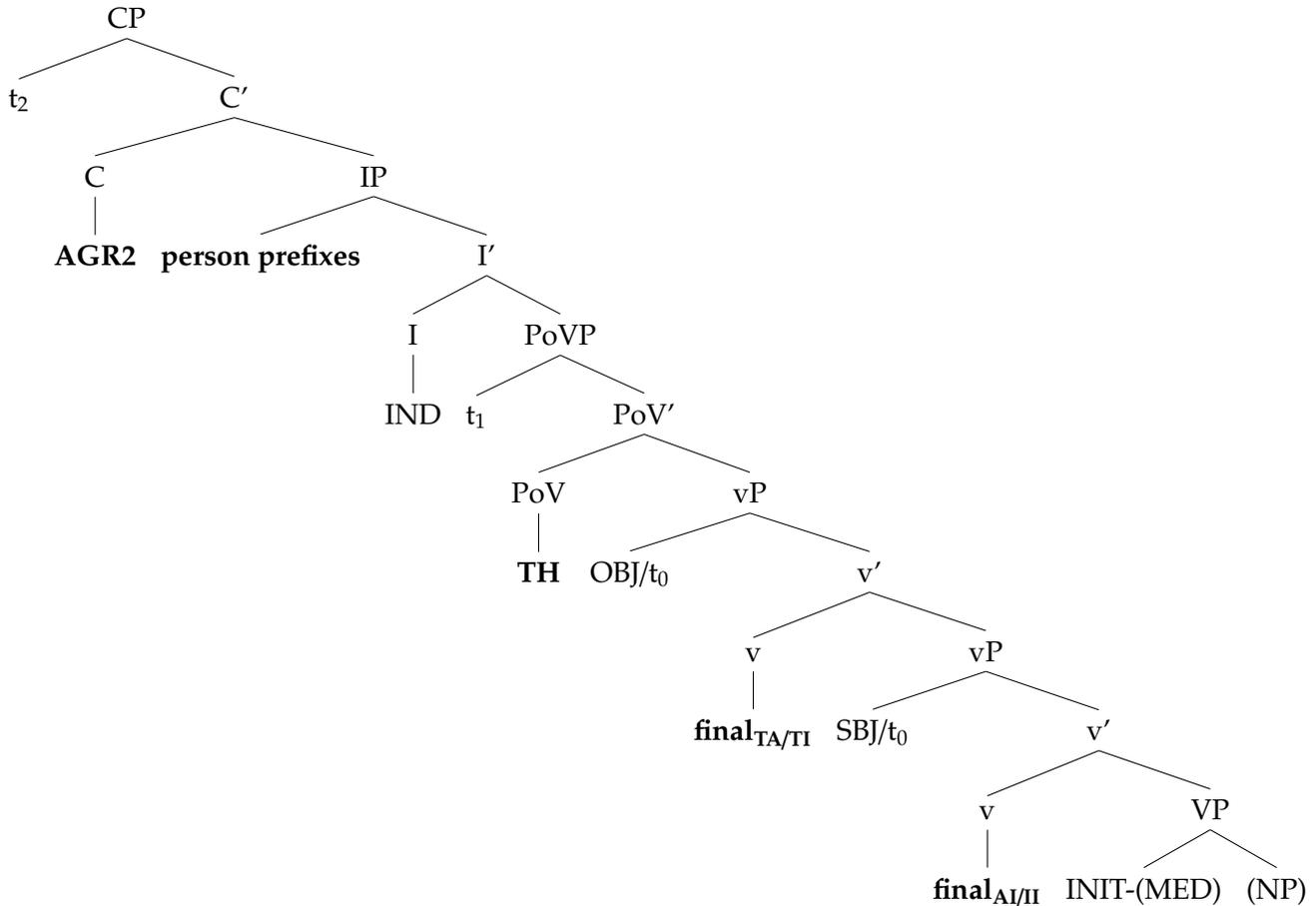
241. Bliss (2013) also discusses the prefix *na-*, which also merges into this position. I do not discuss *na-* here; please see Bliss (2013) for details.

(524) **person prefixes-(preverbs)-[initial-(medial)-final]_{STEM}-TH**



Bliss (2013) locates the number/obviation suffixes (*-yini*_{3,sg,OBV}, *-yi*_{3PL}, *-wa*_{3,PROX}) associated with 3rd person arguments in C. A major part of Bliss (2013)'s analysis is that the proximate number suffix *wa-* is category neutral with respect to whether it merges with a clausal structure in C, or whether it merges with a nominal structure in K. Obviative *yini-* and plural *yi*, on the other hand, are strictly clausal, always merging in C. As this is not relevant for the discussion at hand, however, I abstract away from this part of her analysis. The important thing to note is that these number/obviation suffixes are associated with uninterpretable phi/number features ([SG] [PL]), which trigger movement (of a previously merged overt DP for obviative arguments, or of a previously merged *pro* for proximate arguments) to the specifier of CP.

(525) **person prefixes-(preverbs)-[initial-(medial)-final]_{STEM}-(TH)-(AGR1)-AGR2**



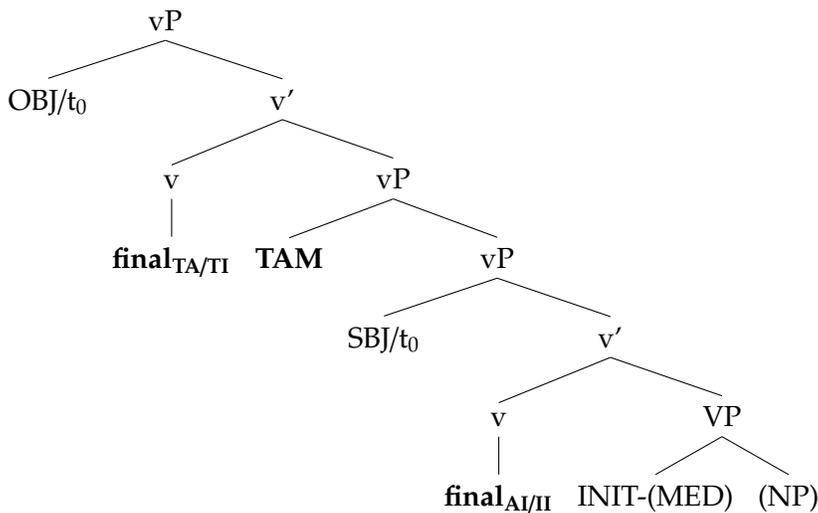
To summarize, Bliss (2013) presents a functional structure whereby the verbal arguments (object and subject) are introduced by recursive vP shells, and these arguments raise to successively higher positions (from the specifier of vP, to the specifier of PoVP and then CP) to satisfy uninterpretable features introduced by the heads of these functional phrases, via an Agree relation. The majority of the person/number agreement morphemes seen on Blackfoot's verbal complex are the morphological reflexes of these Agree relations; the one exception is the person prefixes, which are elements which themselves merge to satisfy Infl's uninterpretable [*u*Pers] feature.

Bliss (2013) and the Action-Dependent Framework

There is one obvious way in which the proposal that Bliss (2013) presents appears incompatible with the sort of functional structure I require for my proposed action-dependent framework. Bliss (2013) assumes that the λx positions introduced by the verb stem (specifically, introduced by the verb final), are immediately satisfied by nominal elements that merge into the specifiers of the recursive vP structure that the verb stem projects. This appears inconsistent with the sort of derivation I have been assuming, where the verb stem does not have its λx positions immediately satisfied, but rather is modified by a host of modifying elements (i.e., aspects like the imperfective, perfective, prospective, and modals like *áak-*, *ohkott-* and *aahkama'p-*) before the individual argument positions

are finally satisfied. The apparent inconsistency, however, relies on the implicit assumption that aspects and modals merge higher than the specifier of vP. Aspects and modals, however, are preverbal elements, which Bliss (2013) does not explicitly situate in her functional structure. If the preverbal elements of interest all merge as modifiers at, or below, the higher v' level, this apparent inconsistency disappears. This is consistent with Ritter (2014)'s observations regarding abstract nominalizations in Blackfoot. Observing that abstract nominalizations in Blackfoot are not compatible with the higher functional structure introduced by Infl/PersP, PoVP and the vP that contains transitive finals, Ritter (2014) concludes that they must represent nominalization at a very early point in the derivation. Tense/aspect/modal markers can appear in these abstract nominalizations, however, which suggests that these preverbal elements merge prior to the higher little v in Bliss (2013)/Ritter (2014)'s structure. This is represented in the tree below.

(526) (TAM preverbs)-[initial-(medial)-final]_{STEM}



In summary, although the assumptions I make regarding Blackfoot's compositional structure and where individual arguments merge seems, at first, incompatible with the sort of morphosyntactic framework that Bliss (2013) presents for Blackfoot, this is only an artifact of the widespread assumption that TAM elements crosslinguistically merge high (relative to a hierarchy of functional projections) in the syntactic structure (cf. Cinque (2002)). The approach that I present here, and Bliss (2013)'s morphosyntactic framework for Blackfoot, can be reconciled if we assume that TAM elements in Blackfoot merge low relative to the hierarchy of functional projections required by the morphosyntax. While this is inconsistent with cartographic approaches á la Cinque (2002), where the semantics of a morpheme dictates its syntactic position in a hierarchy of functional projections, this exactly mirrors the conclusion that Ritter (2014) independently comes to regarding the syntactic position of TAM elements relative to functional projections in Blackfoot.

8.3.3 Summary: Consequences for Blackfoot's Syntax-Semantics Interface

In this section, I have discussed how my action-dependent approach to the semantics of circumstantial modals and agency in Blackfoot can be reconciled with the prevalent proposals regarding Blackfoot's syntactic hierarchy of functional projections - i.e., the Person-based functional hierarchy represented by Ritter & Wiltschko (2004, 2009), Bliss (2005, 2013) and Ritter (2014). I concluded that my assumption that TAM markers in Blackfoot do not correlate to specific functional heads as dictated by a functional hierarchy, but rather are modifiers, requires either (i) the sort of Person-based functional hierarchy that those works cited represent, or (ii) a minimalist approach where there are no functional categories at all. Thus while the approach I present here does not *require* a syntax of the type presented by Ritter & Wiltschko (2004, 2009), Bliss (2005, 2013) and Ritter (2014), it is compatible with these works.

In discussing Bliss (2013)'s particular implementation of the Person-based hierarchy, I further concluded that in order to adopt Bliss (2013)'s framework, my assumptions regarding where individual arguments are satisfied require that Blackfoot TAM markers merge at the v' or vP level. This is an interesting consequence because it is the same conclusion that Ritter (2014) makes based on observations regarding Blackfoot abstract nominalizations. Thus although the conclusions and assumptions that I have made regarding the relative merge position of individual arguments and TAM markers are based on purely on the intuition that the meaning of circumstantial modals requires reference to the agent, the conclusions are consistent with, and even sometimes mirror/support the conclusions that the Ritter & Wiltschko (2004, 2009), Bliss (2005, 2013) and Ritter (2014) have made based on more strictly morphosyntactic observations (e.g., grammaticality judgements regarding co-occurrence restrictions).

8.4 A Glance at Circumstantial Modality in Algonquian

The empirical basis of this dissertation is a description of circumstantial modality in Blackfoot. In this section, I briefly describe how circumstantial modality is expressed in other Algonquian languages. In particular, I discuss Valentine (2001)'s description of circumstantial modality in Nishnaabemwin, and Cook (2008)'s description of circumstantial modality in Plains Cree. Both systems are considerably different from the system of modality described here for Blackfoot.

8.4.1 Circumstantial Modality in Nishnaabemwin

Nishnaabemwin, like Blackfoot, relies on the use of preverbal elements in order to convey inferences about the future. The way that these inferences are expressed, however, differs from Blackfoot in (at least) two significant ways. First, these preverbal elements interact with clause-typing and mood marking in order to convey distinct strengths and flavours of circumstantial modality. Second, the various combinations of preverb, clause-typing and mode marking show a

distinct way of cutting up the semantic range of meanings associated with circumstantial modality, allowing for a greater range of variation in terms of modal strength for a particular combination. In what follows I will describe how Nishnaabemwin expresses the meanings that Blackfoot conveys via the preverbal elements *áak-* "will," *aahkama'p-* "might," and *ohkott-* "be able to." The discussion is based on Valentine (2001)'s Nishnaabemwin reference grammar. As we will see, Nishnaabemwin's form-meaning mappings for expressing circumstantial modality are quite different from what we have seen for Blackfoot.²⁴²

Future Preverbs in Nishnaabemwin

Like Blackfoot, Nishnaabemwin is described as having two dedicated future morphemes, *wii-* and *ga-/da-*. Unlike Blackfoot, however, these two preverbal morphemes do not map onto the English *will* vs *be going to* distinction. Rather, Valentine (2001)'s description suggests that the difference between *wii-* and *ga-/da-* is in terms of the ordering source that the morphemes employ: *wii-* is used to express necessity as ordered by desires, intentions or volition, whereas *da-/ga-* is more commonly used to express necessities that follow from circumstance and obligation - i.e., eventualities that follow from considerations outside of one's own will. Examples of the volitional future preverb *wii-* are given below in (527).

(527) Examples of *wii-* (Valentine 2001:773-776)

- a. *mii noongo dbikak wii-maajaayaan*
 so today be.night.vii **VFUT**-go.away.vai:CONJ:1s
 'Tonight I'm **going to** go away.'
- b. *gaawiin n-(w)ii-bgidnanziimin maanpii endnizyaang*
 NEG 1-**VFUT**-give.up.vti:IND:1PL here where.we.live
 'We **will** not give up this place where we live.'
- c. *mookitwaad giitwenh niwi niinwan, mokmaan wii-bjibwaad*
 assault.vta:CONJ:(3:3') allegedly those men knife **FUT**-stab.vta:CONJ:(3:3')
 '...(he) attacked the other man, **intending to** stab him with the knife.'
- d. *Mii dahs wi Nimkiig ga-nji-zhiingenmaawaad,*
 that's then that Thunderers past-reason-hate.vta:CCNJ:(3P:3')
aano-wii-nsaadwaad
 try.in.vain-**FUT**-kill.vta:CONJ:(3P:3')
 'That's why the Thunderers hated him and tried in vain **to** kill him.'

242. The glosses in this section include grammatical components that are not relevant for Blackfoot. These are listed here. CCNJ = "changed conjunct," CONJ="conjunct", PRET="preterite mode", DUB="dubitative mode" VFUT="volitional future," CFUT="non-volitional future," PRT="particle," EMPH="emphatic."

Notice that with a past-shifted reading, as in (527c) and (527d), the intention expressed by *wii-* need not be fulfilled. This is similar to the behaviour of Blackfoot *áak-* and *áyaak-*, which need not represent **w**₀ necessities when they are interpreted with a past temporal perspective. (527c) and (527d) also show that, like Blackfoot's *áak-* and *áyaak-*, Nishnaabemwin *wii-* is used to convey information about an agent's intentions and volitions. There are also cases, however, where *wii-* is used with inanimate subjects, eg., with weather predicates. Please see Valentine (2001) for more information.

Although there is overlap in terms of the semantic contexts in which *wii-* and *ga-/da-* are used, Valentine (2001) describes Nishnaabemwin's other future preverb, *da-/ga-* as more commonly used to express necessities that follow from circumstance and obligation. This contrasts with *wii-*'s use to express necessities that follow from an agent's intentions and volitions. Examples of *da-/ga-* are given below in (528).

(528) Examples of *da-/ga-* (Valentine 2001:777)

- a. *Mii maa naa gaa-zhi-debweyendmowaad giw nishnabeg giishpin*
 and there EMPH past-result-believe.vti:CCNJ:(3P:0) those Indians if
waabmad aw baanaabe. Waya da-nbo maa
 see.vta:CONJ:(2s:3s) that mermaid any CFUT-die.vai:CCNJ:2s there
endaayan.
 live.vai:CCNJ:2s

'That's just as the Indian believed if you see a mermaid. Someone **will** die there where you live.'

- b. *n-ga-ndawaabmaamin sa aw waagosh waabang, gchigzheb*
 1-CFUT-go.look.for.v PRT that fox tomorrow, early.morning
n-ga-maajaamin
 1-CFUT-leave.vaiIND:1P

'We'll go and look for this fox tomorrow, we'll leave very early.'

- c. *Giiskan iw ggoodaas, g-ga-goodoon dash maa mtigoonsing*
 take.off.vti that your.dress 2-CFUT-hang.vti:IND:(2s:0) then there on.bush

'Take off your dress, **you are to** hang it here on a bush.'

- d. *Nga-nsaa na, gnimaa gegoo iw gaawiin geyaabi*
 1-CFUT-kill.vta:IND:(1s:3s) Y/N, perhaps something that NEG anymore
gegoo ji-zhi-gshkihewzsig
 anything MOD-result-be.powerful.vai:CONJ:3s:NEG

'**Am I to** kill it, or perhaps do something so that it no longer has any power?'

- e. *Gegoo na n-ga-bidoon?*
 anything Y/N 1-CFUT-bring.vti:IND:(1s:0)
 ‘Shall I bring anything?’

The examples in (528c) - (528e) are reflective of Valentine (2001)’s observation that *da-/ga-*’s use with with second person inflection often results in an obligation reading. Although I was unable to find examples of *wii-* with a stative predicate and determine whether a non-prospective reading was available, the highlighted uses of *da-/ga-* in (529) could plausibly be analyzed as cases of *da-/ga-* with a stative preajcent. Whether or not this sort of construction can be interpreted with a non-prospective reading, like Blackfoot *áak-* with stative preajcents, requires further research.

- (529) *wegwen dash aw ge-gshkitoogwen ji-shngwaadzig...*
 whoever then that MOD-able.to.do.vti MOD-keep.down.vai:CONJ:DUB:(3s:0)...
 ...*da-ntaa-ndawenjge da-nbwaakaa miinwa gwyak*
 ...*cfut-be.good.at-hunt.vai:IND:3 cfut-be.wise.vai:ind:3* and straight
da-zhi-yaa
cfut-be.thus.vai:IND:3

‘Whoever may be able to keep it down... ...he’II be a good hunter, he’II be clever and he’II behave right.’
 (Valentine 2001:777)

Ability Readings

There appear to be a variety of ways of expressing ability attributions in Nishnaabemwin. The most common way of expressing ability, given the data in Valentine (2001) as a corpus, is via the root, *gshk*, glossed as “control/manage X.” This root appears to combine with various finals in order to yield ability predicates. For instance, the VAI form *gshkibtoo* “be able to run” is derived via *gshk* and the final *-battoo* “run.” Similarly, the VAI form *gshkitoo* “be able [to do something]” is derived by combining *gshk* with the final *-too* “move, act, experience.” The root *gshk* can also appear with transitivity finals, in which case the resulting ability predicate appears to take a conjunct clause as a preajcent. Examples of these are given below. Notice that the preajcent clause is marked with either the volitional future *wii-* or the conjunct variant of the modal preverb *ji-*.

- (530) a. *gaawin wgii-gshkitoosin wii-nbaad*
 neg PAST-able.to.do.vti vFUT-sleep.vai:CONJ:3s
 ‘He was not **able to** sleep.’ (Valentine 2001:678)
- b. *ji-gshkitoowaad ji-bmasewaad nsimdana dsodbaabaan*
 MOD-able.to.do.vti:CONJ:3PL MOD-walk.along.vai:CONJ:3Pl thirty x.many.miles
ji-bi-giiwewaad
 MOD-??-come.back.home.vai:CONJ:3PL
 ‘They would be **able to** walk thirty miles to come home.’ (Valentine 2001:679)

- c. *wegwen dash aw ge-gshkitoogwen ji-shngwaadzig...*
 whoever then that CFUT-able.to.do.vti MOD-keep.down.vai:CONJ:3s...
 'Whoever may be **able to** keep it down...' (Valentine 2001:127)
- d. *enso-tegi conference, gaawii n-gashktoosiin wii-shaayaanh*
 every-time conference neg 1-able.to.do.vti VFUT-go.vai:CONJ:1s
 'Every time there's a conference, I'm not **able to** go.' (Valentine 2001:264)
- e. *mii dash iw eta gaa-gshkihaajinniw niw zhgaagon*
 and then that only past-able.to.do.vti:CCNJ:(3s:3obv) those skunks
ji-nsaad
 MOD-kill.vta
 'He **could** only kill skunks.' (Valentine 2001:541)

Valentine (2001) also lists a manner adverb, *maamndaa* 'can, be able to' (Valentine (2001):142). This adverb can only occur with negatives, however, and thus is only used to express negative capability. Examples with this adverb are given in (531).

- (531) a. *gaa maamda ji-gtigewaapan mii-sh gii-bskaabiiwaad*
 neg able MOD-farm.vai:CONJ:PRET:3PL and-so past-come.back.vai:CONJ:3PL
 'It was not **possible** for them to farm and so they returned.' (Valentine 2001:147,720)
- b. *gaa go naa maamda wii-wijiiwwed*
 NEG PRT EMPH able fut-accompany.vai:CONJ:3s
 'He **couldn't** go with others.' (Valentine 2001:822)

Valentine (2001) also lists an aspectual preverb *de-* that he glosses as 'be able to/manage to...'. The gloss as 'be able to/manage to' and *de-*'s status as a preverbal morpheme suggests that this is Nishnaabemwin's closest approximation to Blackfoot *ohkott-*. Unfortunately, I was unable to identify examples of this preverb's use in the text. Valentine (2001)'s description of complement clauses that represent unrealized events, however, suggests that ability attributions in Nishnaabemwin, may, like Blackfoot, be subject to actuality entailments. He notes that such complements are usually marked by the volitional future preverb *wii-* (Valentine (2001):785).²⁴³ More more research, however, is required in order to determine how ability attributions in Nishnaabemwin compare to those in Blackfoot. I now move onto how Nishnaabemwin expresses the sort of meaning that Blackfoot expresses via the preverbal morpheme *aahkama'p-* "might."

243. He also identifies a construction that is used to express unrealized possibility in the past. This construction consists of (i) the non-volitional future *da-ga-*, (ii) conjunct clause-type morphology, (iii) past tense morphology *gii-* and preterit mode inflection (Valentine (2001):785).

The Modal Preverb *daa-*

There is no simple mapping between Blackfoot *aahkama'p-* "might" and a particular Nishnaabemwin modal construction. Rather, the semantic contexts in which Blackfoot uses *aahkama'p-* "might," in Nishnaabemwin, are described by a variety of different constructions involving interactions between the volitional future preverb *wii-*, various types of clause-type marking and mode inflection, and what Valentine (2001) glosses as the modal morpheme *daa-*. In this section, I discuss the form-meaning mappings that Nishnaabemwin uses to describe the range of future possibilities that Blackfoot uses *aahkama'p-* to describe.

The modal preverb *daa-* in Nishnaabemwin is used in a variety of constructions to convey different kinds of circumstantial modality. Valentine (2001) states that its English translations include *could*, *should*, *would*, and *might*. Examples of its wide semantic range in indicative clauses are given in (532); notice that the translations for *daa-* range from a deontic *must*, permission *can/may* and weak necessity *should*.

- (532) a. *g-daa-nkwetwaa* *iw maanoo* *ji-zhwenmik*
 2-MOD-accept.vta:IND:(2s:3s) that by.al.means MOD-bless.vta:CONJ:(3s:2s)
 'You **must** accept this being's offer to bless you.'
- b. *n-daa-maajaa* *na gwa?*
 1-MOD-set.off.vai:IND:1s Y/N indeed
 'May I go?'
- c. *g-daa-naadmoon* *na?*
 2-MOD--help.vta:IND:(2s:1) Y/N
 'Should I help you?'
- d. *Aapji n-bakde,* *Maanii. Bezhgoognzhii gwa* *n-daa-mwaa*
 really 1-hungry.vai:IND:1s, Mary. horse indeed MOD-eat.vta:IND:(1s:3s)
 'I'm really hungry, Mary. I **could** eat a horse.'
- e. *waabang na go n-daa-bgiz* *gbegiizhig?*
 tomorrow Y/N PRT 1-MOD-SWIM.vai:IND:1s all.day
 'Tomorrow **can** I go swimming all day?'

Given the wide range of translations, and the fact that the data presented in Valentine (2001) were likely not elicited with the same goals that a researcher specializing in semantic fieldwork would have, a thorough description of *daa-* would require much more research. The data that Valentine (2001) does provide, however, makes it clear that Nishnaabemwin's modal system does not have anything that parallels *aahkama'p-*'s semantic range. For instance, Valentine (2001) states that in order to convey future possibility, Nishnaabemwin uses the modal preverb *daa-* with (i)

conjunct clauses (in which case *daa-* consistently surfaces as *ji-*), and (ii) preterit mode inflection. Valentine (2001) provides the following example in (533).

- (533) *Baamaa niigan wii-aabjitooyaan gye wzhoonyaamsiwaan*
 later in.the.future VFUT-use.vti:CONJ:(1s:0) even have.money.vai:CONJ:1s:NEG
ji-giishpnadooyambaa iw mtig...
 MOD-be.able.to.sell.vti:CONJ:PRET:(1s:0) that wood...

'I intend to use it in the future, later on I **could** sell that wood if I should run out of money...'
 (Valentine 2001:785)

Although Valentine (2001) only provides a single example, the translation for (533) with *could* as opposed to *might* suggests that this construction is used to describe only a portion of the semantic contexts in which Blackfoot *aahkama'p-* "might" is used. Recall that Blackfoot, unlike English, does not morphologically distinguish future vivid and future non-vivid possibilities. Cases where an English speaker would use *might* (future vivid possibility) and *could* (future non-vivid possibility) are both conveyed in Blackfoot with *aahkama'p-*. So how does Nishnaabemwin convey future vivid possibilities - i.e., the sort of circumstantial inferences which would most likely be translated with English *might*? Unfortunately all except one of the relevant examples that I could identify in Valentine (2001) were contained in complex constructions - i.e., Y/N questions, embedded Y/N clauses, if-clauses, or relative clauses. The single exceptional case is reproduced below; the relevant verbal complex is marked with the future **wii-** and conjunct clause-type morphology.

- (534) *mii maanda gaa-zhiwebak sa shkweyaang ge-giizhgak ge wiinwaa*
 so this past-happen.vii:CCNJ PRT following MOD-be.day.vii:CCNJ also they
giw sa shkinweeg wii-gkendmowaad...
 those PRT young.men VFUT-know.vti:CONJ:(3P:0)

'This happened so that in the days to come the young men also **might have knowledge**...'
 (Valentine 2001:824)

A similar example is given below; although Valentine (2001) translates the *wii-* marked conjunct construction with *will get done*, he glosses the form as "could finish."

- (535) *Giishpin naadmawyan mii go ji-giizhiitaayaan moonwagwaa*
 if help.vta:CONJ:(2s:1s) then PRT MOD-finish.vai:CONJ:1s dig.vta:CONJ:(1s:3PL)
kina giw piniig
 all those potatoes

'If you help me I will get done digging up all those potatoes.'
 (Valentine 2001:575)l

This combination of *wii-* with conjunct clause-type morphology does not systematically yield a future possibility reading, however. Recall example (527a), repeated below as (536). In this case the combination does not yield a future possibility, but a future necessity.

- (536) *mii noongo dbikak wii-maajaayaan*
 so today be.night.vii **VFUT-go.away.vai:CONJ:1s**
 'Tonight I'm **going to** go away.'

To summarize, the semantic contexts in which Blackfoot makes use of the preverb *aahkama'p-* "might" are divided up, in Nishnaabemwin, between constructions involving interactions between the volitional future preverb *wii-*, the modal preverb *daa-*, and various types of clause-type marking and mode inflection. There is no simple correlation between the semantic contexts in which Blackfoot uses *aahkama'p-* "might", and the semantic contexts in which Nishnaabemwin's modal constructions can be used. A similar observation can be made regarding the semantic contexts in which Blackfoot uses *áak-* "will" - while *áak-* covers the semantic range that Nishnaabemwin divides between the volitional future *wii-* and the non-volitional future *da-/ga-*, the weak uses of *wii-* represent a range of semantic contexts in which Blackfoot *áak-* cannot be used. The modal system proposed for Blackfoot and English in this dissertation, thus, cannot be viewed as something universal to language. It represents a particular way in which languages can organize their system of conveying circumstantial modality, but it does not represent *the only* way in which a language must organize their system for circumstantial modality.

8.4.2 Circumstantial Modality in Plains Cree

The system of Blackfoot circumstantial modality described in this dissertation is one that is not dissimilar to English, wherein the locus of circumstantial modality can be identified with dedicated modal morphemes - i.e., preverbal *áak-* "will", *aahkama'p-* "might" and *ohkott-* "able to." Nishnaabemwin, as we have just seen, similarly has dedicated modal morphemes - i.e., preverbal *wii-*, *da-/ga-* and *daa-*. Unlike Blackfoot, however, these dedicated modal preverbs interact with other grammatical systems like clause-type and mode inflection, in order to convey different grades of strength and different flavours of circumstantial modality. Plains Cree, like Nishnaabemwin, relies on interactions between different grammatical systems in order to convey the range of meanings associated with circumstantial modality. Cook (2008) shows, however, that unlike Nishnaabemwin and Blackfoot, Plains Cree lacks dedicated modal markers entirely. The range of contexts in which Blackfoot uses *áak-*, *aahkama'p-* and *ohkott-* are described using constructions that involve (i) clause-typing, (ii) preverbal markers and (iii) negation. In what follows I will describe how Plains Cree expresses (or does not express) the meanings that Blackfoot conveys via the preverbal elements *áak-* "will," *aahkama'p-* "might," and *ohkott-* "be able to."²⁴⁴

244. As with the previous section, the glossing conventions in this section necessarily differ from the Blackfoot data. A guide to the glosses is as follows: IRR =irrealis, INV=inverse, SAP=speech-act participant, INTERJ=interjection, TEMP=temporal, SUBJ=subjunctive, c1=changed conjunct 1, DIM=diminutive, OBV=obviative, PREV=previous, USC=unspecified subject construction, CONN=connective

Expressing Future Necessity in Plains Cree

Cook (2008) shows that circumstantial modality in Plains Cree is expressed via a combination of (i) clause typing (i.e., the indicative, simple conjunct and changed conjunct clause types), (ii) preverbal markers (the ‘irrealis’ preverb *ka-* and the (temporal) shifting/anchoring preverb *kî-*, and (iii) negation.²⁴⁵ Inferences about the future with “will”-like translations are expressed by using a combination of (i) indicative clause marking and (ii) the irrealis *ka-*. Examples are provided in (537).

(537) *ka-* + INDEPENDENT: “Will” Constructions

- a. ...*mâka pikw îspî ka-takosin*
mâka pikw îspî ka-takosin-w
 ...but all TEMP IRR-arrive.vai-3
 ‘...but he **will** be back any time now.’ (Cook 2008:332)
- b. *nika-mâkohikwak kiskêyihahkwâwi*
ni-ka-mâkoh-ikw-ak kiskêyihah-k-wâw-i
 1-IRR-trouble.vta-INV-pl know.vti-0-PL-SUBJ
 ‘They **will** give me trouble if they find out.’ (Cook 2008:332)
- c. ...*â, êkota nika-pôsipayihon...*
 ...*â, êkota ni-ka-pôsipayiho-n...*
 ...INTERJ there 1-IRR-jump.vai-SAP
 ‘...Well, I will jump on that...’ (Cook 2008:22)

Cook (2008) then shows that the Plains Cree ‘irrealis’ preverb *ka-* yields a deontic reading when it occurs in simple conjunct clauses. She provides the following examples.

(538) *ka-* + INDEPENDENT: “Should” Construction

ka-p- ka-pîkiskwâtâyahkik, ka-wâpahtihâyahkik
ka-pâhpi-yahk ka-pîkiskwâtâ-yahk-k ka-wâpahtihâyahkik
 IRR-laugh.vai-21pl IRR-speak.vta-21pl-3pl IRR-show.vta-21pl-3pl
ê-kitimâkêyimâyahkik.
ê-kitimâkêyimâ-yahk-k
 c1-care.vta-21pl-3pl

‘We **should** laugh and speak to these young people, we **should** show them that we care for them.’

245. The uses for *kî-* that Cook (2008) discusses for the most part are temporal - i.e., it indicates a previous temporal reference time. Later, however, she generalizes *kî-*'s function to be one of general shifting/anchoring.

Cook (2008) characterizes the difference between these two constructions as being one of modal base - circumstantial versus deontic. According to the system of modality that I have been assuming, the contrast is actually one in terms of ordering source - i.e., both constructions have a circumstantial modal base but differ in that the *ka-* + INDEPENDENT "will" constructions have a stereotypical ordering source while the *ka-* + SIMPLE CONJUNCT "should" constructions have a deontic or preference-related ordering source.

Cook (2008) also gives examples of the deontic *ka-* + SIMPLE CONJUNCT construction embedded under the predicative element *piko*. This predicative element appears to strengthen the modal claim, given the "have to" translations as compared to the "should" translations above, as shown in (539).

(539) *piko* [*ka-* + INDEPENDENT]: "Have to" Construction

- a. *piko ka-kanâcihcikêyân, ayis nisîmsak, oskinîkiwak, ê-wî-pê-kîyokêcik*
piko ka-kanâcihtcikê-yân ayis ni-sîmis-ak oskinîkiw-ak ê-wî-pêkîyokê-t-k
 NECC mphIRR-clean.vai-1 for 1-sibling-pl youth-pl c1-int-DIR-visit.vai-3-pl

'I have to clean the house, because my siblings, young men, are coming to visit.'

- b. **Context:** I am scheduled to work today; if I don't go in, they fire me.

piko ka-atohoskêyân anohc
 NECC IRR-work.vai-1 today

'I have to go to work.'

Cook (2008) also points out that these constructions can have purely circumstantial necessity readings, as shown by the examples in (540).

(540) *piko* [*ka-* + INDEPENDENT]: "Have to" Construction

- a. **Context:** On the phone, feel cough coming on, say this to excuse yourself.

piko ka-atohoyân
piko ka-atoho-yân
 NECC IRR-cough.vai-1

'I have to cough.'

- b. **Context:** Falling asleep while talking to someone, keep falling forward, can't stay awake any longer, about to pass out.

piko ka-nipâyân
piko ka-nipâ-yân
 NECC IRR-sleep.vai-1

'I have to cough.'

As Plains Cree does not allow independent clauses in embedded contexts, as in the embedded context that *piko* creates, Cook (2008) concludes that *piko* neutralizes the previously-observed restrictions on how *piko*'s complement clause can be modally interpreted.

There are two observations we can make about the data in (539) and (540). First, under the semantic framework assumed in this dissertation, the purely circumstantial readings in (540) are not exactly the same as the "will"-type readings that the *ka-* + INDEPENDENT express. The "will" type readings would be analyzed as necessities due to a combination of circumstantial factors and an agent's preference-ordered volitions. The purely circumstantial readings in (540) would be analyzed as necessities based solely on circumstantial factors. The neutralization of modal flavour that Cook (2008) observes is thus not necessarily as simple as allowing either the unembedded "will" or "should" reading in embedded contexts. Second, the range of meanings allowed by the *piko* + *ka-* + SIMPLE CONJUNCT constructions call to mind the range of meanings that the Nishnaabemwin *da/-ga-* preverb expresses - i.e., future necessities that follow from "consequence or obligation, rather than will" (Rhodes 1985:124, cited in Valentine 2001.) Thus while Cook (2008) concludes that the independent/simple-conjunct meaning distinction is lost in embedded contexts where the independent is ruled out for independent reasons, we could also interpret the *ka-* + SIMPLE CONJUNCT constructions as allowing future necessity readings, where these necessities uniformly follow from non-volitional considerations. In other words, regardless of whether the *ka-* + SIMPLE CONJUNCT construction is embedded or not, it has the same range of modal interpretations.

Expressing Ability in Plains Cree

Ability attributions in Plains Cree are expressed by adding the preverbal morpheme *kî-* to the *ka-* + INDEPENDENT. In previous parts of Cook (2008), *ki-* is identified as a temporal shifter, although given this (among other) non-temporal uses, she argues that it is not a purely temporal morpheme.

(541) *ka-* + *kî-* + INDEPENDENT: Ability Constructions

- a. *ka-kî-tâhkonêw* *acimôsa*
ka-kî-tâhkon-ê-w *atimw-isis-a*
 IRR-PREV-carry.vta-DIR-3 dog-DIM-OBV
 'S/he is **able to** carry the puppies.'
- b. ...*matwân* *cî* *kwayask* *nika-kî-isi-tâhkôtên*
matwân *cî* *kwayask* *ni-ka-kî-isi-tâhkôtê-n*
 EVID Q proper 1-IRR-PREV-THUS-discuss.vti-SAP
 '...I wonder if I will be **able to** discuss it with proper faithfulness.'

Cook (2008) also provides the examples in (542a) and (542b), where she glosses the verb *kask-ihâtâ* as *able.vai*. Cook (2008)'s discussion regarding the example in (542a), however, provides *suc-*

ceed.at.vai as the gloss for *kaskihtâ*. Whether this variation in glossing reflects the presence/absence of actuality entailments is a question for further research.

(542) *kaskihtâ*: Ability Predicate Constructions

- a. *mihcêt aniki ê-kî-kaskihtâcik aya ê-mîkisihkahcikêcik êkospî*
mihcêt aniki ê-kî-kaskihtâ-t-ik aya ê-mîkisihkah-t-ik êkospî
 many DEM.AN c1-PREV-able.vai-3-PL CONN c1-do.beadng.vai-3-PL then
iskwêwak...
iskwêw-ak
 woman-PL

'Many of the women used to be able to do beadwork then, ...' (Cook 2008:225)

- b. *...matwân cî ka-kaskihtânânaw sôniyâw ka-mowâyahk?*
matwân cî ka-kaskihtâ-nânaw sôniyâw ka-mow-â-yan-k?
 wonder Q IRR-able.vai-21PL money IRR-eat.vta-DIR-2-PL?

'...I wonder if we will be able to eat money?' (Cook 2008:249)

There thus appear to be at least two ways of expressing ability attributions in Plains Cree: (i) via the ability/success predicate *kaskihtâ*, and by adding *kî-* to a "will" *ka-* + INDEPENDENT construction. Cook (2008) also states that the addition of *kî-* to a *ka-* + SIMPLE CONJUNCT construction yields a "should" as opposed to "have to" reading. The translations she provides for the data, however, are ones where the *ka-* + SIMPLE CONJUNCT constructions are translated with "should" and the *ka-* + *kî-* + SIMPLE CONJUNCT constructions are translated with "supposed to" or permission "can."

(543) *ka-* + *kî-* + SIMPLE CONJUNCT: Weakened Deontic Constructions

- a. *ka-kî-tâhkonât acimôsa*
ka-kî-tâhkon-â-t atimw-isis-a
 IRR-PREV-carry.vta-DIR-3 dog-DIM-OBV

'S/he is supposed to carry the puppies.' CONJUNCT

- b. *nika-kî-itohtâyân cî*
ni-ka-kî-itohtê-yân cî
 1-IRR-PREV-go.vai-1 Q

'Can I go?' CONJUNCT

In any case, however, the strength of the modal claim is weakened with the addition of *kî-*. Cook (2008) describes the function of *kî-* in these modal constructions as shifting the quantificational force from universal to existential. Given the action-dependent framework I have proposed, however, I would suggest that the quantification over circumstantially-accessible worlds remains universal, but that *kî-* restricts the domain of quantification by introducing a(n additional) preference-based ordering source. In the case of the *ka-* + INDEPENDENT construction, this preference-based ordering

source applies on top of the standard bouletic ordering source on $\mathcal{A}(x,w,t)$, reducing the quantification over actions so that it approaches the strength of an existential quantifier over actions. This yields an ability reading. In the case of the *ka-* + SIMPLE CONJUNCT, the additional preference-based ordering source, on top of a deontic ordering source on $C(x,w,t)$, weakens the strength of the modal claim in the way that von Fintel & Iatridou (2008) propose for the weak necessity modal "ought."

Negation and Modality in Plains Cree

Cook (2008) does not directly address how future possibility of the type that would be translated as "might" is expressed in Plains Cree. She does discuss, however, a range of what she classifies as negated existential readings. These arise, unsurprisingly, via interactions with negation. There are three constructions of interest:

1. Negated *kî-* + *ka-* + INDEPENDENT constructions
2. Negated *kî-* + *ka-* + SIMPLE CONJUNCT constructions
3. Negated *kî-* + INDEPENDENT constructions

In what follows, I address the range of meanings associated with these constructions. First, recall that *kî-* + *ka-* + INDEPENDENT constructions yield circumstantial ability attributions. Cook (2008) shows that when these constructions combine with negation, however, the negated possibility can be interpreted with either a circumstantial or deontic flavour, as shown below. (544a) is an example of a negated purely circumstantial claim, (544b) is an example of a negated deontic claim, and (544c) is an example that is felicitous in both purely circumstantial and deontic contexts.

(544) Negated *kî-* + *ka-* + INDEPENDENT constructions

- a. ...*môy pikw îspî ka-kîkâhcitinâwak...*
môy pikw îspî ka-kîkâhcitin-â-w-ak...
 NEG Q TEMP KA-KÎ-take.hold.vta-USC-3-PL

'You cannot get a hold of that kind just any time.'

- b. ...*môy nika-kî-âkayâsîmon aya...*
môy ni-ka-kî-âkayâsîmo-n aya
 NEG 1-IRR-PREV-English.vai-SAP CONN

'I must not say it in English.'

- c. *môy ka-kî-mâtow Sarah*
môy ka-kî-mâto-w Sarah
 NEG IRR-PREV-cry.vai-3 Sarah

'Sarah can't cry.' (either unable, or not allowed)

Second, recall that *kî-* + *ka-* + SIMPLE CONJUNCT constructions yield deontic readings with translations like “supposed to” or permissive “can.” When these constructions occur under negation, however, the negated possibility is felicitous in both purely circumstantial or deontic contexts. The example in (545a) negates a purely circumstantial claim, (545b) is an example of a negated deontic claim.

(545) Negated *kî-* + *ka-* + SIMPLE CONJUNCT constructions

- a. ...*tâpiskôt*, *tâpiskôc* *môy ka-kî-miyw-âyâcîk*
tâpiskôt, *tâpiskôt-i* *môy ka-kî-miyw-âyâ-t-k*
 seem seem NEG IRR-PREV-good-be.vai-3-PL

‘It seems as though they cannot recover.’

- b. *êwakw ânim âyisiyiniwak*, *namôy ka-kî-wanikiskisicîk*
êwakw ânima âyisiyiniw-ak, *namôy ka-kî-wanikiskisi-t-k*
 TOPIC DEM.INAN person-PL NEG IRR-PREV-forget.vai-3-PL

‘That is something people should not forget.’

Finally, in all of the previously discussed cases, the shifter preverb *kî-* occurred with the irrealis preverb *ka-*. However, when it occurs by itself under negation, in independent clauses, it yields a (negated) circumstantial reading. Examples of these are provided in (546). Cook (2008) notes that this construction, like the previously discussed examples, strictly expresses negated circumstantial possibility - i.e., deontic readings are not permitted.

(546) Negated *kî-* + INDEPENDENT constructions

- a. *môy nikî-kiskisin*
môy ni-kî-kiskisi-n
 NEG 1-PREV-remember.vai-SAP
 ‘I can’t remember.’’
- b. *môy ê-kî-tâhkonât* *acimôsisâ*
môy ê-kî-tâhkon-â-t *atimw-isis-a*
 NEG c1-PREV-carry.vta-DIR-3 dog-DIM-OBV

‘S/he can’t carry the puppies.’ (eg., she’s too small, not strong enough).

One thing to note is that the above construction is the only construction that lacks the irrealis *ka-*, and is also the only construction that appears to be restricted to a purely circumstantial reading, wherein the actions available to the agent make no difference to the truth-value assigned to the prejacent. Given the theoretical framework I have proposed here, we might predict the lack of action-sensitivity to correlate with the lack of a prospective interpretation. Whether this prediction is borne out by the data - i.e., whether the construction in (546) can be interpreted with

a prospective temporal orientation - is a question for further research.

To summarize, in this section I have discussed how Nishnaabemwin and Plains Cree, two languages related to Blackfoot, express various kinds of circumstantial modality. Both systems differ in interesting ways from Blackfoot, both in terms of (i) the morphosyntactic correlates of circumstantial modality and (ii) the categories of circumstantial modality that systematically map onto particular morphosyntactic constructions. I have not attempted to provide a compositional analysis for either system as more in-depth semantic fieldwork would be required in order to determine the distribution and range of circumstantial meanings and their interaction with temporality.

8.5 Extensions for Further Research

In the previous section, I discussed the consequences of my action-dependent semantics for Blackfoot's syntax-semantics interface. In this section I discuss consequences and extensions of my overall proposal for other semantic phenomena in Blackfoot, as well as other languages crosslinguistically.

Recall that the main empirical contribution of the dissertation has been the documentation of Blackfoot's circumstantial modals *áak-*, *aahkama'p-*, *ohkott-* and the imperfective *á-*. In particular, I focussed on their interactions with temporality and conditional constructions. The main intuition underlying the theoretical framework I've proposed is that the truth-conditions associated with circumstantial modal claims reflect inferences about how the world unfolds, based not only on an individual's circumstances, but also on the range of **ACTIONS** that the individual has available to them. Although I am not the first researcher to incorporate the notion of an action into a linguistic framework, to my knowledge, this dissertation represents the first that incorporates actions into a linguistic framework that accounts for sub-sentential elements like tense and aspect. While the empirical focus has been on Blackfoot circumstantial modals, I have proposed that the action-dependent framework also better accounts for the behaviour of the English circumstantial modals. An obvious extension of the work presented here, then, would be to investigate how the notion of actions can shed light on the behaviour of circumstantial modals crosslinguistically. Are there purely circumstantial modals that are better represented without reference to an individual's actions, or does the semantic bundling of actions and circumstance I've proposed reflect a crosslinguistic category of modal?

Another obvious extension of the work presented here is an investigation into the domain of deontic modality. Deontic modals, like the modals discussed in this dissertation, have also been analyzed as involving a circumstantial modal base; recall that Kratzer analyzes deontic modals like *must* as involving a deontic (i.e., law-based) ordering source and circumstantial modal base. The obvious question to ask at this point is whether an action-dependent perspective can shed light on

the properties of deontic modals. Given my fieldwork impressions of Blackfoot's deontic modal *sstsina'*-, this appears to be a fruitful avenue of research. Although I did not yet gather the complete set of context-utterance minimal pairs required to include a thorough discussion of *sstsina'*- in this dissertation, *sstsina'*- appears to have the same properties as the ability modal *ohkott*- in terms of the range of temporal perspectives the modal allows (as documented for *ohkott*- in chapter 4). For instance, a bare *sstsina'*- claim appears to always be interpreted with a past temporal perspective. An example of a bare *sstsina'*- claim is provided in (547).

- (547) **Context:** There was an amusement park in the city we used to live in. In order to ride the biggest roller coaster at the amusement park, you had to be taller than a cardboard cutout of a 160cm tall bear. We're reminiscing.

kítsstsinaí'tsspitaama *oma kiaayo*
 kit-**sstsina'**-ní'to-sspitaam-a-wa oma kiaayo
 2-**DEONT**-same-be.tall.as?.VTA-2:3-3 DEM bear

'You had to have been taller than that bear.'

≠'You have to be taller than that bear.' i.e., infelicitous in following context:

Context: I'm standing in line for the roller-coaster. When I get to the front of the line, I see the ride attendant standing next to the cardboard cutout of a 160cm tall bear. The ride attendant looks at me, looks at the bear, and then informs me that I have to be taller than the bear (in order to ride the roller coaster).

In order to convey a deontic claim with a present temporal perspective, the *sstsina'*- claim requires a stativizing element, like the imperfective *á*-, or the modal *áak*-. (548) is an example with *áak*- and a present temporal perspective.

- (548) **Context:** Martina's hockey team will not make the playoffs if they don't win this next game.

áaksstsinaomotsaakiyaa
áak-sstsina-omotsaaki-yi-aawa
FUT-DEONTIC-win.VAI-3PL-DTP

'They have to win.'

The following *áak*- and *á*- modified examples were offered as felicitous in a past temporal perspective context. My consultant also provided translations which suggesting that they are also compatible with a present temporal perspective.

- (549) **Context:** There was an amusement park in the city we used to live in. In order to ride the biggest roller coaster at the amusement park, you had to be taller than a cardboard cutout of a 160cm tall bear. We're reminiscing.

ohkott- with respect to its interaction with conditional constructions and the distribution of actuality entailments is a question that I leave for further research.

The incorporation of actions thus appears as if it may be able to shed light on the behaviour of deontic modals in Blackfoot, but what about deontic modality more generally? Would theories of deontic modality benefit from an action-dependent perspective? Feldman (1986) and Hacquard (2006) make a distinction between two kinds of deontics: *ought-to-do* and *ought-to-be* deontics. These two kinds of deontic readings are illustrated with (552a) and (552b) respectively. While (552a) expresses an obligation that the subject, Wickham, must fulfill, (552b) is a claim about the way a just or ideal world is. While it can also express a claim about an obligation that murderers must fulfill, that is not the most straightforward reading.

- (552) *Ought-to-do* and *Ought-to-be* Deontic Examples (based on Hacquard (2006):40)
- a. Wickham should apologize.
 - b. Murderers should to go to jail.

I suggest that the *ought-to-do* deontic modals, at least, can benefit from an action-dependent perspective. The action-dependent framework, for example, allows for both a deontic and stereotypical ordering source. This is beneficial as I judge the claim in (553) to be true in the given context, but only under the assumption that we're only considering worlds where the normal course of events obtains - i.e., worlds where if you have a 1 in 1000 chance of picking out a particular ball from a bin, you are one of the 999 out of 1000 who don't pick the winning ball.

- (553) **Context:** You're a contestant on a gameshow. There's a bin of 1000 red balls and one of these red balls has a white star on it. If you pick out the white star ball, you get \$5000. If you pick out a red ball with no star, you have to give back all your current winnings (\$1000). If you refuse the challenge, you get to take home your current winnings. Without this money you're broke, and you need \$1000 to pay off your bookie, or he'll break your legs.

You should refuse the challenge.

The unlikely outcome wherein you take the challenge and manage to pick out the winning ball is actually a better outcome (you can pay off your bookie and invest the leftover money), but this world is ruled out by a stereotypical ordering source. While the aforementioned approach to deontic modality involves only a circumstantial modal base and deontic ordering source, the action-dependent approach can treat deontic modals as involving a deontic ordering on an action modal base, and a stereotypical ordering source on a circumstantial modal base. Finally, recall that the core intuition of the dissertation is that circumstantial modal claims express inferences about the future, and that the truth-conditions associated with these claims rely not only on

the circumstances surrounding the agent, but also the actions available to the agent. *Ought-to-do* deontic modal claims can be viewed as expressing advice, commands or instructions for the future. And if our inferences about the future are restricted by the actions available to us, it seems intuitively right that advice and instructions for the future should be too.

Bibliography

- Abusch, Dorit. 1985. *On Verbs and Time*: University of Massachusetts, Amherst dissertation.
- Abusch, Dorit. 1994. Sequence of Tense Revisited: Two Semantic Accounts of Tense in Intensional Contexts. *Ellipsis, Tense and Questions*. *Dyana2 Esprit Basic Research Project* 6852.
- Abusch, Dorit. 2012. Circumstantial and Temporal Dependence in Counterfactual Modals. *Natural Language Semantics* 20(3). 273–297.
- Aijmer, Karin. 1985. The Semantic Development of *Will*. *Historical Semantics, Historical Word-Formation* 11–21.
- Alur, Rajeev, Thomas A Henzinger & Orna Kupferman. 2002. Alternating-time Temporal Logic. *Journal of the ACM (JACM)* 49(5). 672–713.
- Anderson, Alan Ross. 1951. A Note on Subjunctive and Counterfactual conditionals. *Analysis* 12:2. 35–38.
- Armoskaite, Solveiga. 2011. *The Destiny of Roots in Blackfoot and Lithuanian*: University of British Columbia dissertation.
- Arregui, Ana. 2005. *On the Accessibility of Possible Worlds: The Role of Tense and Aspect*: University of Massachusetts Amherst dissertation.
- Arregui, Ana. 2007. When Aspect Matters: the Case of *Would*-Conditionals. *Natural Language Semantics* 15(3). 221–264.
- Arregui, Ana. 2010. Detaching If-clauses from *Should*. *Natural Language Semantics* 18(3). 241–293.
- Arregui, Ana, María Luisa Rivero & Andrés Salanova. 2011. Imperfectivity: Capturing Variation Across Languages. *Manuscript*. To appear in *Proceedings of MOSS 2*.
- Aune, Bruce. 1967. Hypotheticals and Can: Another Look. *Analysis* 27(6). 191–195.
- Austin, J. L. 1961. Ifs and Cans. *Philosophical Papers* .
- Bach, Emmon. 1986. The Algebra of Events. *Linguistics and Philosophy* 9(1). 5–16. [doi:10.1007/BF00627432](https://doi.org/10.1007/BF00627432).
- Baglini, Rebecca. 2010. *Get* as an Implicative Verb. Ms, University of Chicago.

- Baier, Kurt. 1963. Could and Would. *Analysis* 20–29.
- Bar-El, Leora, Henry Davis & Lisa Matthewson. 2004. On Non-Culminating Accomplishments. In *Proceedings of NELS.*, vol. 35, 87. GLSA, UMass/Amherst.
- Bar-el, Leora Anne. 2005. *Aspectual Distinctions in Skwxwú7meshz*: University of British Columbia dissertation.
- Barczak, Leszek Krzysztof. 2007. *Towards an Analysis of Yorùbá Conditionals: its Implications for Phrase Structure*. University of British Columbia MA thesis.
- Beck, Sigrid & Hotze Rullmann. 1999. A Flexible Approach to Exhaustivity in Questions. *Natural Language Semantics* 7(3). 249–298.
- Belnap, Nuel. 1991. Backwards and Forwards in the Modal Logic of Agency. *Philosophy and Phenomenological Research* 51(4). 777–807.
- Belnap, Nuel. 1992. Branching Space-time. *Synthese* 92(3). 385–434.
- Belnap, Nuel & Michael Perloff. 1988. Seeing to it that: a Canonical Form for Agentives. *Theoria* 54. 175–199.
- Bennett, M. & B.H. Partee. 1978. *Toward the Logic of Tense and Aspect in English*. Indiana University Linguistics Club.
- Bhatt, Rajesh. 1999. *Covert Modality in Non-finite Contexts*: University of Pennsylvania dissertation.
- Bhatt, Rajesh. 2006. *Covert Modality in Non-finite Contexts*. Mouton de Gruyter.
- Bhatt, Rajesh & Roumyana Pancheva. 2006. Conditionals. *The Blackwell Companion to Syntax* 638–687.
- Bliss, Heather. 2005. Formalizing Point-of-view: The Role of Sentience in Blackfoots Direct/Inverse system .
- Bliss, Heather & Bettina Gruber. 2011. Decomposing Blackfoot Proclitics. *Handout GLOW* .
- Bliss, Heather Anne. 2013. *The Blackfoot Configurationality Conspiracy: Parallels and Differences in Clausal and Nominal Structures*: University of British Columbia dissertation.
- Bloomfield, Leonard. 1946. Algonquian. In Harry Hoijer (ed.), *Linguistic Structures of Native America*, Viking Fund Publications in Anthropology.
- Bonomi, Andrea. 1997. Aspect, Quantification and When-clauses in Italian. *Linguistics and Philosophy* 20(5). 469–514.
- Brand, Myles. 1979. The Fundamental Question in Action Theory. *Nous* 131–151.

- Brown, Mark A. 1988. On the Logic of Ability. *Journal of Philosophical Logic* 17(1). 1–26.
- Bullshields, Beatrice, Solveiga Armoskaite, Michael Barrie, Heather Bliss, Joel Dunham, Jennifer Glougie, Meagan Louie & Martina Wiltschko. 2013. Collecting a Blackfoot Creation Story: Methodological and Empirical Observations. In *Workshop on the structure and constituency of the languages of the americas 15*, UBC Working Papers in Linguistics.
- Burton, Strang & Lisa Matthewson. 2011. Totem Field Storyboards. Paper presented at the 46th International Conference on Salish and Neighbouring Languages, University of British Columbia.
- Carlson, Gregory Norman. 1977. *Reference to Kinds in English*: University of Massachusetts, Amherst dissertation.
- Carlson, Gregory Norman & Francis Jeffrey Pelletier. 1995. *The Generic Book*. University of Chicago Press.
- Chellas, Brian F. 1992. Time and Modality in the Logic of Agency. *Studia Logica* 51(3-4). 485–517.
- Chellas, Brian Farrell. 1968. *The Logical Form of Imperatives*. Department of Philosophy, Stanford University.
- Chen, Sihwei, Vera Hohaus, Rebecca Laturus, Meagan Louie, Lisa Matthewson, Hotze Rullmann, Ori Simchen, Claire K Turner & Jozina Vander Klok. Under Reviewa. Part I: Past Possibility Cross-linguistically: Evidence from 13 languages. In Ana Arregui Andrés Pablo Salanova & Marisa Rivero (eds.), *Modality Across Syntactic Categories*, Oxford University Press.
- Chen, Sihwei, Vera Hohaus, Rebecca Laturus, Meagan Louie, Lisa Matthewson, Hotze Rullmann, Ori Simchen, Claire K Turner & Jozina Vander Klok. Under Reviewb. Part II: Past Possibility Cross-linguistically: Evidence from 13 languages. In Ana Arregui Andrés Pablo Salanova & Marisa Rivero (eds.), *Modality Across Syntactic Categories*, Oxford University Press.
- Chierchia, G. 1998. Reference to Kinds Across Language. *Natural Language Semantics* 6(4). 339–405.
- Chin, Shujun Koon. 2008. Aspectual Classification of Blackfoot Predicates. Qualifying Paper, University of British Columbia.
- Chomsky, Noam. 1995. *The Minimalist Program*, vol. 28. Cambridge Univ Press.
- Cinque, Guglielmo. 2002. *Functional structure in DP and IP* (The Cartography of Syntactic Structures 1). Oxford University Press.
- Condoravdi, Cleo. 2002. Temporal Orientation of Modals: Modals for the Present and Modals for the Past. In B.Clark D.Beaver, L.Martinez & S. Kaufmann (eds.), *The Construction of Meaning*, 59–88.

- Cook, Clare Elizabeth. 2008. *The Syntax and Semantics of Clause-typing in Plains Cree*: University of British Columbia dissertation.
- Copley, Bridget. 2002. *The Semantics of the Future*: Massachusetts Institute of Technology dissertation.
- Copley, Bridget. 2006. What Should 'should' Mean? In *Language Under Uncertainty Workshop, Kyoto University, January 2005*, .
- Copley, Bridget. 2009. *The Semantics of the Future* Outstanding Dissertations in Linguistics. Routledge, Kindle Edition.
- Copley, Bridget. 2010. Towards a Teleological Model for Modals. *Talk presented at the Paris Working Sessions on Modality, Goals and Events, CNRS/ENS/Paris VIII* .
- Copley, Bridget & Heidi Harley. 2011. Force Dynamics for Event Semantics: Reifying Causation in Event Structure. Ms.
- Cover, Rebecca Tamar. 2010. *Aspect, Modality, and Tense in Badiaranke*: University of California, Berkely dissertation.
- Cross, Charles B. 1986. 'Can' and the Logic of Ability. *Philosophical Studies* 50. 53–64.
- Csipak, Eva. 2013. The Meaning of Free Factive Subjunctives. Presented at ICL (International Congress of Linguistics) 19.
- Dancygier, Barbara. 1998. *Conditionals and Prediction: Time, Knowledge and Causation in Conditional Constructions*, vol. 87 Cambridge Studies in Linguistics. Cambridge University Press.
- Dancygier, Barbara & Eve Sweetser. 2005. *Mental Spaces in Grammar: Conditional Constructions* Cambridge Studies in Linguistics.
- Davidson, David. 1967. Causal Relations. *The Journal of Philosophy* 64(21). 691–703.
- Davis, Henry, Meagan Louie, Lisa Matthewson, Ileana Paul, Tyler Peterson & Amelia Reis Silva. 2010. Perfective Aspect and Actuality Entailments: a Cross-linguistic Approach. In *Proceedings of the Semantics of Under-represented Languages of the Americas (SULA 5)*, .
- Déchaine, Rose-Marie. 1999. What Algonquian Morphology is really like: Hockett revisited. *MIT occasional papers in linguistics* 17. 25–72.
- Déchaine, Rose-Marie & Martina Wiltschko. 2011. Micro-variation in Agreement, Clause-typing and Finiteness: Comparative Evidence from Blackfoot and Plains Cree. Ms., *University of British Columbia* .
- Dell, Francois. 1983. An Aspectual Distinction in Tagalog. *Oceanic Linguistics* 175–206.

- Deo, Ashwini. 2009. Unifying the Imperfective and the Progressive: Partitions as Quantificational Domains. *Linguistics and philosophy* 32(5). 475–521.
- DeRose, Keith & Richard Grandy. 1999. Conditional Assertions and “Biscuit” Conditionals. *Noûs* 33. 405–420.
- Derrick, Donald. 2007. Syllabification and Blackfoot /s/. *Proceedings of NWLC* 22. 62–76.
- Dowty, David R. 1979. *Word Meaning and Montague Grammar*. Dordrecht, The Netherlands: D. Reidel Publishing Company.
- Dunham, Joel. 2008. A Unified Analysis of the Habitual and In-Progress Readings of *á* in Blackfoot. 1st Qualifying Paper, University of British Columbia.
- Edwards, Betty. 1999. *The New Drawing on the Right Side of the Brain: The 1999 3rd Edition*. Penguin.
- Emerson, E Allen & Edmund M Clarke. 1982. Using Branching Time Temporal Logic to Synthesize Synchronization Skeletons. *Science of Computer programming* 2(3). 241–266.
- Enç, M. 1996. Tense and Modality. *The handbook of contemporary semantic theory* 345. 358.
- Ethnologue. 2013. Blackfoot Language. In M Paul Gary F. Simons Lewis & Charles D. Fennig (eds.), *Ethnologue: Languages of the World Seventeenth edition*, .
- Fauske, Kjell Magne. 2008. Free body diagrams, [texample.net](http://www.texample.net/tikz/examples/free-body-diagrams/). Accessed 2014-08-24. <http://www.texample.net/tikz/examples/free-body-diagrams/>.
- Feldman, Fred. 1986. *Doing the Best We Can: an Essay in Informal Deontic Logic*, vol. 35 Philosophical Studies Series in Philosophy. D. Reidel Publishing Company.
- Fillmore, Charles. 1986. Varieties of Conditional Sentences. In *The proceedings of ESCOL 3 (Eastern States Conference on Linguistics)*, 16382.
- von Fintel, Kai. 2012. 59. Conditionals. In *Semantics*, vol. 3, Walter de Gruyter.
- von Fintel, Kai. & Anthony S. Gillies. 2010. Must... stay... strong! *Natural Language Semantics* 18(4). 351–383.
- von Fintel, Kai & Sabine Iatridou. 2005. What to Do if You Want to Go to Harlem: Anankastic Conditionals and Related Matters. *Manuscript, MIT* .
- von Fintel, Kai & Sabine Iatridou. 2008. How to say ought in foreign: The composition of weak necessity modals. In *Time and Modality*, 115–141. Springer.
- Folli, Raffaella & Heidi Harley. 2005. Flavors of *v*: Consuming Results in Italian and English. In Roumyana Slabakova & Paula Kempchinsky (eds.), *Aspectual Inquiries*, 95–120. Dordrecht: Kluwer.

- Frantz, Donald. 1971. *Toward a Generative Grammar of Blackfoot (with Particular Attention to Selected Stem Formation Processes)*. A publication of the Summer Institute of Linguistics of the University of Oklahoma.
- Frantz, Donald G. 1970. *Towards a Generative Grammar of Blackfoot (with Particular Attention to Selected Stem Formation Processes)*: University of Alberta dissertation.
- Frantz, Donald G. 1991. *Blackfoot Grammar*. Toronto, Canada: University of Toronto Press.
- Frantz, Donald G. 2009. *Blackfoot Grammar: Second Edition*. Toronto, Canada: University of Toronto Press.
- Frantz, Donald G. & Norma J. Russell. 1995. *Blackfoot dictionary of Stems, Roots and Affixes*. Toronto, Canada: University of Toronto Press.
- Giannakidou, Anastasia. 2001. The Meaning of Free Choice. *Linguistics and philosophy* 24(6). 659–735.
- Giannakidou, Anastasia & Eleni Staraki. 2010. Ability, Action, and Causation: from Pure Ability to Force. In A. Mari, C. Beyssade & F. Del Prete (eds.), *Genericity*, .
- Ginzburg, Jonathan. 1995. Resolving Questions, I. *Linguistics and Philosophy* 18(5). 459–527.
- Glougie, Jennifer. 2000. Topics in the Syntax and Semantics of Blackfoot Quantifiers and Nominals. MA Thesis, University of British Columbia.
- Goddard, Ives. 1967. The Algonquian Independent Indicative. *National Myseum of Canada Bulletin* 214. 66–106.
- Goddard, Ives. 1974. Review of *Toward a Generative Grammar of Blackfoot: with Particular Attention to Selected Stem Formation Processes*. *Language* 50. 601–604.
- Groenendijk, Jeroen & Martin Stokhof. 1984. On the semantics of questions and the pragmatics of answers. *Varieties of Formal Semantics* 3. 143–170.
- Hacking, Ian. 2001. *An Introduction to Probability and Inductive Logic*. Cambridge [England]: Cambridge University Press.
- Hackl, Martin. 1998. On the Semantics of "Ability Attributions" Ms.
- Hacquard, Valentine. 2006. *Aspects of Modality*: Massachusetts Institute of Technology dissertation.
- Hamblin, C. L. 1973. Questions in Montague English. *Foundations of Language* 10. 41–53.
- Heim, Irene. 1983. On the Projection Problem for Presuppositions. In *Proceedings of WCCFL*, vol. 2 1, 14–1.

- Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar* Blackwell Textbooks in Linguistics. Blackwell Oxford.
- Higginbotham, James. 2000. Accomplishments. In *Proceedings of GLOW in Asia II*, 72–82.
- Hintikka, Jaakko. 1975. Semantics for Propositional Attitudes. In *Models for Modalities*, 87–111. Springer.
- Hockett, Charles F. 1966. What Algonquian is Really Like. *International Journal of American Linguistics* 32(1). 59–73.
- Horn, Lawrence. 1989. *A Natural History of Negation*, vol. 960. University of Chicago Press Chicago.
- Horty, John F. 1989. An Alternative STIT Operator. *Manuscript, Philosophy Department, University of Maryland*.
- Horty, John F. 2001. *Agency and Deontic Logic*. Oxford University Press.
- Horty, John F. & Nuel Belnap. 1995. The Deliberative STIT: A Study of Action, Omission, Ability and Obligation. *Journal of Philosophical Logic* 24. 583–644.
- Iatridou, Sabine. 2000. The grammatical ingredients of counterfactuality. *Linguistic Inquiry* 31(2). 231–270.
- Ippolito, Michela. 2003. Presuppositions and Implicatures in Counterfactuals. *Natural Language Semantics* 11(2). 145–186.
- Jäger, Gerhard. 2008. Applications of Game Theory in Linguistics. *Language and Linguistics Compass* 2(3). 406–421.
- Jóhannsdóttir, Kristín M. 2011. *Aspects of the Progressive in English and Icelandic*: University of British Columbia dissertation.
- Josselin de Jong, JPB de. 1914. Blackfoot Texts from the Southern Piegians Blackfoot Reservation Teton County. *Johannes Müller*.
- Kamp, Hans. 1978. The Logic of Historical Necessity. Unpublished manuscript.
- Kamp, Hans & Uwe Reyle. 1993. *From Discourse to Logic: Introduction to Model-Theoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory* 42. Springer.
- Katz, E.G. 1996. *Stativity, Genericity, and Temporal Reference*: University of Rochester dissertation.
- Kaufmann, Stefan. 2005. Conditional Truth and Future Reference. *Journal of Semantics* 22(3). 231–280.
- Kenny, Anthony. 1975. Human Abilities and Dynamic Modalities. In *Essays on Explanation and Understanding*, 209–232. Springer.

- Kiyota, Masaru. 2008. *Situation Aspect and Viewpoint Aspect: From Salish to Japanese*: University of British Columbia dissertation.
- Klein, Wolfgang. 1994. *Time in language*. Psychology Press.
- Koenig, Jean-Pierre & Nuttannart Muansuwan. 2000. How to End Without Ever Finishing: Thai semi-perfectivity. *Journal of Semantics* 17(2). 147–182.
- Kratzer, Angelika. 1977. What *must* and *can* Must and Can Mean. *Linguistics and Philosophy* 1(3). 337–355.
- Kratzer, Angelika. 1981. Partition and Revision: The Semantics of Counterfactuals. *Journal of Philosophical Logic* 10. 242–258.
- Kratzer, Angelika. 1986. Conditionals. *Chicago Linguistics Society* 22(2). 1–15.
- Kratzer, Angelika. 1989. An Investigation into the Lumps of Thought. *Linguistics and Philosophy* 87:1. 3–27.
- Kratzer, Angelika. 1991. Modality. In A. von Stechow & D. Wunderlich (eds.), *Semantics: an international handbook of contemporary research*, Berlin, Germany: de Gruyter.
- Kratzer, Angelika. 1996. Severing the External Argument from the Verb. In Johann Rooryck & Laurie Zaring (eds.), *Phrase structure and the lexicon*, 75–115. Dordrecht, The Netherlands: Kluwer.
- Kratzer, Angelika. 1998. Scope or Pseudoscope? Are there Wide-scope Indefinites? In Susan Rothstein (ed.), *Events and grammar*, 163–196. Kluwer Academic Publishers.
- Kratzer, Angelika. 2011. What *can* can mean. Lecture notes for LING 753: Topics in Semantics.
- Kratzer, Angelika. 2012. *Modals and Conditionals: New and Revised Perspectives*. Oxford Univ Press.
- Krifka, Manfred. 1989. Nominal Reference, Temporal Constitution and Quantification in Event Semantics. In Renate Bartsch, Johan F. A. K. van Benthem & Peter van Emde Boas (eds.), *Semantics and contextual expression*, 75–115. Foris Publications.
- Krifka, Manfred. 1992. Thematic Relations as Links between Nominal Reference and Temporal Constitution. *Lexical matters* 2953.
- von Kutschera, Franz. 1998. Bewirken. *Erkenntnis* 24. 253–281.
- Labov, William. 1972. Some principles of linguistic methodology. *Language in society* 1(01). 97–120.
- Laca, Brenda. 2008. Modal Tenses and Tensed Modals. In *Selected Proceedings of Chronos 2008*, .
- Landman, Fred. 1992. The Progressive. *Natural Language Semantics* 1(1). 1–32.

- Lauer, Sven & Cleo Condoravdi. To appear. Preference-Conditioned Necessities: Detachment and Practical Reasoning. *Pacific Philosophical Quarterly* .
- Leech, G.N. 1971. *Meaning and the English verb*. Essex, U.K.: Longman Group Limited.
- Lewis, David K. 1975. Adverbs of Quantification. *Formal semantics* 178–188.
- Lewis, David K. 1981. Ordering Semantics and Premise Semantics for Counterfactuals. *Journal of philosophical logic* 10(2). 217–234.
- Link, Godehard. 1983. The Logical Analysis of Plurals and Mass Terms: A Lattice-theoretical Approach. In Ch. Schwarze R. Bäuerle & A. von Stechow (eds.), *Meaning, Use and Interpretation of Language*, 302–323.
- Louie, Meagan. 2013. Constraints on Licensing If-clauses in Blackfoot. In Shan Luo (ed.), *Actes du Congrès de l'ACL 2013/2013 CLA Conference Proceedings*, Toronto Working Papers in Linguistics.
- Louie, Meagan. 2014. Action-determined Temporal Perspectives in Blackfoot. Paper presented SULA8 (The Semantics of the Under-represented Languages of the Americas), University of British Columbia.
- Mari, Alda & Fabienne Martin. 2007. Tense, Abilities and Actuality Entailments. In *Proceedings of the 16th Amsterdam Colloquium*, Universiteit van Amsterdam, ILLC.
- Mari, Alda & Fabienne Martin. 2009. On the Interaction between Aspect and Verbal Polysemy:(Im)-perfectivity and (Non)-implicativity. Manuscript, Institut Jean Nicod and University of Stuttgart.
- Matthewson, Lisa. 2004. On the Methodology of Semantic Fieldwork. *International Journal of American Linguistics* 70(4). 369–415.
- Matthewson, Lisa. 2012. On the (Non)-Future Orientation of Modals. In *Proceedings of Sinn und Bedeutung* 16, 431–446.
- McCall, S. 1984. Counterfactuals based on Real Possible Worlds. *Nous* 463–477.
- Menzies, Stacey. 2013. *Nsyilxcen Modality: Semantic Analysis of Epistemic Modality*. University of British Columbia MA thesis.
- Merin, Arthur. 1999. Information, Relevance, and Social Decision Making: Some Principles and Results of Decision-Theoretic Semantics. *Logic, Language, and Computation* 2. 179–221.
- Mondadori, Fabrizio. 1978. Remarks on Tense and Mood: the Perfect Future. *Studies in Formal Semantics: Intensionality, Temporality, Negation* 223–248.
- Montague, Richard. 1973. The Proper Treatment of Quantification in Ordinary English. *Formal Semantics* 17–34.

- Moore, George Edward. 1903. *Principia Ethica*. Cambridge University Press.
- Palmer, F.R. 1986. Mood and Modality.
- Palmer, F.R. 2001. *Mood and Modality: Second Edition*. Cambridge University Press.
- Parikh, Prashant. 2001. *The Use of Language*. CSLI Publications Stanford, CA.
- Parikh, Rohit. 1994. Vagueness and Utility: The Semantics of Common Nouns. *Linguistics and Philosophy* 17(6). 521–535.
- Parsons, Terence. 1989. The Progressive in English: Events, states and Processes. *Linguistics and Philosophy* 12(2). 213–241.
- Parsons, Terence. 1990. *Events in the Semantics of English*. Cambridge: MIT Press.
- Partee, Barbara. 1973. Some Transformational Extensions of Montague Grammar. *Journal of Philosophical Logic* 2(4). 509–534.
- Peterson, Tyler Roy Gösta. 2010. *Epistemic Modality and Evidentiality in Gitksan at the Semantics-Pragmatics interface*: University of British Columbia dissertation.
- Portner, Paul. 1997. The Semantics of Mood, Complementation, and Conversational Force. *Natural Language Semantics* 5(2). 167–212.
- Portner, Paul. 1998. The Progressive in Modal Semantics. *Language* 760–787.
- Portner, Paul. 2007. Imperatives and Modals. *Natural Language Semantics* 15. 351–383. doi:10.1007/s11050-007-9022-y.
- Portner, Paul. 2009. *Modality*. Oxford University Press, USA.
- Potts, Christopher. 2003. *The Logic of Conventional Implicatures*: University of California Santa Cruz dissertation.
- Prior, Arthur N. 1957. *Time and Modality*. Oxford University Press.
- Prior, Arthur N. 1967. *Past, Present and Future*, vol. 154. Clarendon Press Oxford.
- Prior, Arthur N. 2003. *Time and Modality*. Oxford University Press.
- Pustejovsky, James. 1995. *The Generative Lexicon*. The MIT Press.
- Ramchand, Gillian. 2008. *Verb Meaning and the Lexicon: A First Phase Syntax*, vol. 116 Cambridge Studies in Linguistics. New York: Cambridge University Press.
- Reichenbach, Hans. 1947. *Elements of Symbolic Logic*. New York: Macmillan Co.

- Reis Silva, Amelia. 2009a. Circumstantial Modality in Blackfoot. Paper presented at Chronos 9 at the Université Paris-Diderot.
- Reis Silva, Amelia. 2009b. Two Futures in Blackfoot. Manuscript.
- Reis Silva, Amelia. in Prep. *Aspects of Modality in Blackfoot*: University of British Columbia dissertation.
- Reis Silva, Amelia. & Jennifer. Glougie. 2007. The Form and Function of Two Futures in Blackfoot and Statimcets.. *Proceedings of SULA 4: Semantics of Under-Represented Languages in the Americas* 183–196.
- Reis Silva, Amelia & Lisa Matthewson. 2008. An Instantaneous Present Tense in Blackfoot. In Amy Rose Deal (ed.), *Proceedings of SULA IV*, UMOP.
- Resnik, Michael D. 1987. *Choices: An Introduction to Decision Theory*. U of Minnesota Press.
- Rhodes, Richard A. 1985. *Eastern Ojibwa-Chippewa-Ottawa Dictionary*. Walter de Gruyter.
- Rips, Lance J & Jonathan E. Adler. 2008. *Reasoning: Studies of Human Inference and its Foundations*. Cambridge University Press.
- Ritter, Elizabeth. 2014. Nominalizing Inner Aspect: Evidence from Blackfoot. Ms, based on a presentation at 2012 Workshop on Nominalization.
- Ritter, Elizabeth & Sara Rosen. 2000. Event Structure and Ergativity. In Carol Tenny & James Pustejovsky (eds.), *Events as Grammatical Objects: The Converging Perspectives of Lexical Semantics and Syntax*, 187–238. CSLI Publications.
- Ritter, Elizabeth & Martina Wiltschko. 2004. The Lack of Tense as a Syntactic Category: Evidence from Blackfoot and Halkomelem. In *39th International Conference on Salish and Neighbouring Languages*, vol. 14, .
- Ritter, Elizabeth & Martina Wiltschko. 2005. Anchoring Events to Utterances without Tense. In *Proceedings of WCCFL*, vol. 24, 343–351.
- Ritter, Elizabeth & Martina Wiltschko. 2009. Varieties of Infl: Tense, location, and person. *Alternatives to cartography* 153–202.
- Rizzi, Luigi. 1997. The Fine Structure of the Left Periphery. In *Elements of Grammar*, 281–337. Springer.
- Roberts, Craige. 1996. Information structure in Discourse: Towards an Integrated Formal Theory of Pragmatics. *Working Papers in Linguistics-Ohio State University Department of Linguistics* 91–136.
- van Rooy, Robert. 2001. Relevance of Communicative Acts. In *Proceedings of the 8th Conference on Theoretical Aspects of Rationality and Knowledge*, 83–96. Morgan Kaufmann Publishers Inc.

- Rothstein, Susan D. 2004. *Structuring Events: a Study in the Semantics of Lexical Aspect*. Wiley-Blackwell.
- Rullmann, Hotze. 1995. *Maximality in the Semantics of Wh-Constructions*: UMass Amherst dissertation.
- Rullmann, Hotze, Lisa Matthewson & Henry Davis. 2008. Modals as distributive indefinites. *Natural Language Semantics* 16(4). 317–357.
- Samarin, William J. 1967. *Field linguistics: A guide to linguistic field work*. Holt, Rinehart and Winston New York.
- Schachter, Paul & Fe T. Otones. 1983. *Tagalog Reference Grammar*. University of California Press.
- Schulz, Katrin. 2008. Non-Deictic Tenses in Conditionals. In *Proceedings of SALT*, vol. 18, 694–710.
- Schwarzschild, Roger. 1996. *Pluralities*. Springer.
- Segerberg, Krister. 1989. Bringing it About. *Journal of Philosophical Logic* 18(4). 327–347.
- Simons, Mandy, Judith Tonhauser, David Beaver & Craige Roberts. 2010. What Projects and Why? In *Proceedings of SALT 20*, vol. 24, 309–327.
- Smith, Carlota S. 1997. *The Parameter of Aspect*, vol. 43. Springer.
- Smith, M. 1988. Reason and Desire. In *Proceedings of the Aristotelian Society* 88, 24358.
- Stalnaker, Robert. 1974. Pragmatic Presuppositions .
- Stalnaker, Robert. 1998. Pragmatic Presuppositions. *Pragmatics* 16.
- von Stechow, Arnim, Sveta Krasikova & Doris Penka. 2006. Anankastic conditionals again. *A Festschrift for Kjell Johan Sæbø* 151–171.
- Sweetser, Eve. 1991. *From Etymology to Pragmatics: Metaphorical and Cultural Aspects of Semantic Structure*, vol. 54 Cambridge Studies in Linguistics. Cambridge University Press.
- Tailfeathers, Esther. 1993. *Blackfoot for Beginners. Books 1, 2, and 3*. Edmonton, Alberta: ERIC.
- Talmy, Leonard. 2000. *Toward a Cognitive Semantics, Vol. 1: Concept Structuring Systems*. The MIT Press.
- Tarski, Alfred. 1956. The Concept of Truth in Formalized Languages. *Logic, Semantics, Metamathematics* 2. 152–278.
- Taylor, A. R. 1969. *A Grammar of Blackfoot*: UC Berkely dissertation.
- Thalberg, I. 1969. Austin on Abilities. In *Symposium on JL Austin*, 182–205. Humanities Press Inc., New York.

- Thomas, Guillaume. 2012. *Temporal implicatures*: Massachusetts Institute of Technology dissertation.
- Thomason, Richmond. 2005. *Ability, Action and Context*. Ms, University of Michigan.
- Thomason, Richmond H. 1970. Indeterminist Time and Truth-value Gaps. *Theoria* 36(3). 264–281.
- Travis, Lisa. 2000. Event Structure in Syntax. In Carol Tenny & James Pustejovsky (eds.), *Events as Grammatical Objects: The converging perspectives of lexical semantics and syntax*, 145–185. CSLI Publications.
- Uhlenbeck, Christianus Cornelius. 1911. *Original Blackfoot Texts*. Amsterdam: Johannes Müller.
- Uhlenbeck, Christianus Cornelius. 1912. *A New Series of Blackfoot texts from the Southern Peigans Blackfoot Reservation, Teton County, Montana: with the help of Joseph Tatsey, collected and published with an English translation*, vol. 13 1. Amsterdam: Johannes Müller.
- Uhlenbeck, Christianus Cornelius. 1938. *A Concise Blackfoot Grammar: Based on Material from the Southern Peigans*. Amsterdam, Netherlands: Noord-Hollandsche uitgevers-maatschappij.
- Valentine, Randy. 2001. *Nishnaabemwin Reference Grammar*. University of Toronto Press.
- Van Rooy, Robert. 2003. Questioning to Resolve Decision Problems. *Linguistics and Philosophy* 26(6). 727–763.
- Veltman, Frank. 2005. Making Counterfactual Assumptions. *Journal of Semantics* 22. 159–180. doi:10.1093/jos/ffh022.
- Vendler, Zeno. 1957. Verbs and Times. *The Philosophical Review* 66(2). 143–160.
- Weber, Natalie & Lisa Matthewson. 2013. The Semantics of Blackfoot Internal Arguments. In *Papers of the 45th Algonquian Conference*, .
- Wiltschko, Martina. 2014. *The Structure of Universal Categories. Towards a Formal Typology*. Cambridge University Press.
- Wiltschko, Martina & Rose-Marie Déchaine. 2009. *Interface Syntax*. Ms, UBC.
- Wittgenstein, Ludwig. 1922. *Tractatus Logico-philosophicus (Pears and McGuinness Translation)*. Harcourt, Brace and Company, Inc.
- Xie, Zhiguo. 2012. The Modal Uses of *de* and Temporal Shifting in Mandarin Chinese. *Journal of East Asian Linguistics* 21(4). 387–420.
- Zeevat, Henk. 1994. Applying an Exhaustivity Operator in Update Semantics. *Ellipsis, Tense and Questions. DYANA-2 deliverable 2*.
- Zucchi, Sandro. 1999. Incomplete Events, Intensionality and Imperfective Aspect. *Natural Language Semantics* 7(2). 179–215.

Appendix A

Data Appendix

In chapter 5, I showed that causally-interpreted SUBJUNCTIVE conditional antecedents, where the consequent clause is headed by the future modal *áak-*, are subject to temporal restrictions. The same generalisation holds true for consequent clauses headed by the "might" modal *aahkama'p-*. The data showing this is given below.

- (554) **Context:** When my brother was very young, his pet frog got sucked up the filter. Because he was a very sensitive child, we told him the frog went back to live with its family. Twelve years later, we figure it's safe to tell him now.

kamsskssinisi anohk omáánista'píhpi aahkama'psaoohsikíí
kam-ssksini-si anohk om-aanist-a'pii-hp-yi **aahkama'p**-sa-ohtsikii
if-know.VTI-SBJ:3 now 3-manner-happen.VII-CJ-0 might-NEG-care.about.sthg.VAI

'If he found out what happened now, he might not care.'

- (555) **Context:** I am getting revenge on my brother. I have smeared vaseline all over the toilet seat so that he has a surprise when he sits down. My sister is dubious about my plan and asks me how I plan to make sure he goes to the bathroom. I figure I might know how to do this, because my brother tends to be lactose-intolerant.

kamsskai'ssimiísi ónnikis, aahkama'potoisapiohsi
kam-sska'-simi-si onnikis, **aahkama'p**-oto-isapiohsi
if-extreme-drink.VAI-SBJ:3 milk, FUT-go.to-have.the.runs.VAI

'If he drinks a lot of milk, he might have the runs.'

- (556) **CONTEXT** My sister was running in a race yesterday. I haven't heard whether she won or not yet, but I hope she did, because if she won, we might eat cake to celebrate.

kamomo'tsaakisi matónni ninaahkama'pitsoyihpinnaan pisátsskiitaan
kam-omo'tsaaki-si matonni nit-aahkama'p-it-Ioyi-hpinnaan pisatsskiitaan
if-win.VAI-SBJ:3 yesterday 1-might-RL-eat.VAI-1PL.EXCL cake

'Target: If she won yesterday, we might eat cake.'

- (557) **CONTEXT** My sister was running in a race yesterday. I haven't heard whether she won or not yet, but I hope she did, because if she won, we'll eat cake to celebrate.

íimotsaaki'ohtopi matónni ninaahkama'pitsoyihpinnaan pisátsskiitaan
ii-omo'tsaaki-ohtopi matonni nit-aahkama'p-it-Ioyi-hpinnaan pisatsskiitaan
ic-win.VAI-UNR yesterday 1-might-RL-eat.VAI-1PL.EXCL cake

'If she won yesterday, we might eat cake.'

(558) **Context:** We aren't sure if Martina is at the department or not. I saw her earlier, but maybe she's left campus since then. I do know, however, that Martina sometimes locks her office before she leaves, so I can find out that way, whether or not she left.

- a. # *annahk Piitaakii kamomatapoosi*
 annahk Piitaakii kam-omatoo-si
 DEM Piitaakii if-leave.VAI-SBJ:3
 'If Piitaakii left...'
- b. *annahk Piitaakii kamikoomatapoosi*
 annahk Piitaakii kam-ikaa-omatoo-si
 DEM Piitaakii if-PERF-leave.VAI-SBJ:3
 'If Piitaakii has left...'
- c. *annahk Piitaakii iimatapoosi*
 annahk Piitaakii ii-omatoo-ohtopi
 DEM Piitaakii ic-leave.VAI-UNR
 'If Piitaakii left...'

aahkama'pitapiyookimaa
aahkama'p-itapiyookimaa
 might-lock.VAI
 '...she might have locked up.'

(559) **Context:** Meagan is such a bad dancer that watching her dance is very unpleasant. Beatrice is walking into a party where she knows Meagan might be, and tells herself:

kamáihpiyisi, ninaahkama'pkomatapoo
 kam-á-ihpiyi-si, nit-aahkama'p-omatapoo
 if-impf-dance.VAI-SBJ:3, 1-might-leave.VAI
 'If she's dancing, I might go.'

(560) **Context:** Amelia has tricked me into thinking that our term paper has to be 50 pages long. Last she saw, I was writing frantically. Amelia are walking back to the department now, and you figure:

- a. *annahk Meagan kamsakiaisinaakisi, annahk Amelia*
 annahk Meagan kam-sa:ki-a-sinaaki-si, annahk Amelia
 DEM Meagan if-still-?IMPF-write.VAI-SBJ:3, DEM Amelia
áaksstonnatsikahsi'taki
áak-sstonnat-ikahsi'taki-wa
 FUT-really-laugh.VAI-3
 'If Meagan is still writing, Amelia will really laugh'

- b. *annahk Meagan kamsakiaisinaakisi, ninaahkama'psstonnatsikahsi'taki*
annahk Meagan kam-sa:ki-a-sinaaki-si, ni-aahkama'p-sstonnat-ikahsi'taki
 DEM Meagan if-still-?IMPF-write.VAI-SBJ:3, 1-might-really-laugh.VAI
 'If Meagan is still writing, I might really laugh'

(561) **Context:** Amelia has tricked me into thinking that our term paper has to be 50 pages long. Last she saw, I was writing frantically. Amelia are walking back to the department now, and you figure:

- a. *annahk Meagan kamáísinaakisi, annahk Amelia áaksstonnatsikahsi'taki*
annahk Meagan kam-á-sinaaki-si, annahk Amelia áak-sstonnat-ikahsi'taki-wa
 DEM Meagan if-impf-write.VAI-SBJ:3, DEM Amelia FUT-really-laugh.VAI-3
 'If Meagan is still writing, Amelia will really laugh'

- b. *annahk Meagan kamáísinaakisi, ninaahkama'psstonnatsikahsi'taki*
annahk Meagan kam-á-sinaaki-si, ni-aahkama'p-sstonnat-ikahsi'taki
 DEM Meagan if-impf-write.VAI-SBJ:3, 1-might-really-laugh.VAI
 'If Meagan is still writing, I might really laugh'

(562) **Context:** I think I want to buy a dog, but the guy at the petshop keeps trying to sell me cats, fish, ferrets, etc. Finally he brings out one last animal, and I say:

- kamaanista'psisi imitaa, ninaahkama'pkohpommata*
kam-aanist-a'pssi-si imitaa nit-aahkama'p-ohpomaat-a
 if-manner-bism.VAI-3:bj dog 1-might-buy.VTA-1:3
 'If it's a dog, I might buy it.'