ACQUISITION OF PREFIXED DENOMINAL CAUSATIVES
IN POLISH

by

KRYSTYNA WROBEL

B.A. Hons., Jagiellonian University

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Department of Audioology and Speech Sciences
The University of British Columbia
Vancouver, Canada

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ABSTRACT

Forty-eight Polish-speaking children divided into 4 age groups: the 3’s, 5’s, 7’s and 9’s, participated in a study of the acquisition of prefixed denominal causatives. Twelve short (1.0-1.5 minute) video scenes were used as stimuli for the elicitation of existing and novel denominals. Deverbal items were used as a reference point for examining acquisition of denominals. Each video scene showed a protagonist actively involved in a causal action. The action scenes were nonverbal, except that the protagonist always provided a noun or verb, from which a prefixed causative was to be derived. Analysis of variance indicated significant main effects for Age and Item Type. The youngest children performed worst and the oldest performed best, with deverbal items being the easiest, followed by existing denominals, then novel denominals. This sequence of acquisition was not contradicted by the performance of any subject. A significant Age x Item Type interaction was also found, and reflected the fact that the older children performed better on the deverbal items than on the novel nominal items, while the younger children performed poorly on all item types. The major predictor of children’s performance was their knowledge of the function of verbal suffixes in denominal derivatives, followed by their ability to perform a semantic analysis of the prefixes. Perfectivisation through prefixation was found easy even for the youngest subjects. Other factors, such as linguistic expression of causality, phonological and phonotactic skills, and metalinguistic knowledge combined with cognitive skills, might have played a role, however, more research needs to be done to estimate involvement of these factors in the acquisition process.
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CHAPTER ONE

INTRODUCTION

Knowledge of language, or in other words "language competence" (Chomsky, 1968), governs the actions of speaking and decoding messages. Such competence is an example of tacit knowledge since, in general, speakers of a language cannot define the rules of their native language. Despite their inability to describe such rules, they provide evidence for what they know about language by translating their knowledge into actions. Linguistic performance, then, sets up a base for analyzing language, its content, form and use.

Children entering school are often considered competent speakers of their native language, but, in fact, gaining proficiency in one's language is a process that continues over the life span. The content of language (or, in other words, semantics of language) evolves in the course of human development and consists of topics which vary with age and culture. The form of language (or in other words, the surface features of what was expressed with the use of linguistic means) changes without any formal instruction and provides evidence of the content of an individual's knowledge. Finally, language use (or pragmatics) develops as a result of an increasing participation of an individual in the world.

Language development studies typically concentrate on description of language structure expressed by a grammar constraints (or the rules) and on the sequence of acquisition of particular forms. Verbs are the most complex of the word classes and, therefore, provide measure of a child's mastery of the grammatical rules of the language (Lund & Duchan,
This study focuses on the acquisition of one particular form of verbs in Polish. The verbs studied in this project share four main characteristics. They are all: 1) perfective, 2) prefixed, 3) derived from nouns (denominals), and 4) causal. These prefixed denominal causal verbs are very productive in Polish, but they are not completely regular. In regard to content, they combine the meaning of a prefix and a stem word (a noun). In regard to syntax, the stems of these prefixed denominal causatives function as arguments and the verb suffixes as predicates; for example, in the prefixed derivative do-drzew-i-ć 'to plant more trees' the nominal stem drzew- 'a tree' functions as the argument, while the verb suffix -i- attached to the nominal stem during the denominalization stage functions as the predicate marker. In all examples, the prefixes convey perfective aspect as well as locative notion.

The organization of this thesis is as follows. Chapter One, Introduction, begins with an overview of morphology of the Polish verb and includes some essential information about the morphological structure of the verb, followed by developmental data on acquisition of verbs in Polish. Since the topic of this study is the acquisition of prefixed denominal causative verbs, all of which are perfective, the chapter discusses verbal aspect, prefixation, denominalization and causality. Relevant developmental data on the acquisition of the verb characteristics in Polish are provided when available. In cases where Polish data are not available, data from other languages are presented. To make the material manageable, each part of the Introduction begins with an outline and ends with a summary consisting of predictions relevant to that particular topic. Finally, the Chapter ends with
a purpose statement and overall predictions regarding the acquisition of verbs tested in this study. Chapter Two, Method, provides the description of the materials used in the experiment and the experiment itself. Chapter Three, Results, presents group and individual results of the experiment. Chapter Four, Discussion, is devoted to interpretation of the results examined in the light of the literature review presented in the Introduction.

MORPHOLOGICAL STRUCTURE AND ACQUISITION OF POLISH VERBS

Overview

Polish verbs are characterized by the categories of gender, person, number, mood, tense and aspect (Gladney, 1983; Smoczyńska, 1985; Stanisławski, 1990, Strutyński, 1993). Gender is distinct from person and is expressed only in the past and some forms of the future tense. Three persons are distinguished and used in two distinctive sets, according to whether they refer to single objects or persons (singular number) or to collections of them (plural number). Three moods are differentiated according to the way they are dependent on the character of the utterance in which the verb functions as a predicate. These are the: 1) indicative mood, 2) subjunctive (conditional) mood, and 3) imperative mood. Active and passive voice are discrete. Verbs which can be used in both the active and passive voice are transitive. Intransitive verbs usually possess the forms of the active voice. In addition to active and passive constructions, some verbs have a reflexive form marked by the reflexive marker się. The tense system is very simple and involves three tenses: present, past and future. The present tense embraces present events, lasting or habitual events, e.g. *Ziemia obraca się dookoła własnej osi* 'The Earth turns around its
own axis'. The past tense refers to past events, e.g. *On wrócił ze sklepu* 'He came back from the store', and the future tense to events anterior to events in the past, e.g. *On pójdzie do sklepu* 'He will go to the store'. Three conjugation types are distinguished based on the inflectional ending of the 1st person singular *ja* 'I' and the 2nd person singular *ty* 'you' in the present tense (Stanislawski, 1990). The category of aspect is fundamental in the verbal system. With few exceptions, a given verb belongs to one of the two aspeccual categories, perfective or imperfective (Grzegorczykowa, 1979).

**Morphological structure of a verb**

The morphological structure of a Polish verb is very complex, so that only information pertinent to this study will be presented here. Typically a verb consists of a stem and an ending. Each verb has two formative stem types. The first one is the formative stem of the present tense, derived from the 3rd person plural, for instance:

pisz- in *pisz-q* 'They are writing'\(^1\)

The second one is a formative stem of the Past tense, derived from the 3rd person plural of the non-virile gender, for instance:

pisza- in *pisza-ty* 'They were writing'.

Each verb has one inflectional stem, which can be obtained from a verb after taking off the personal ending, for example: a personal ending `-e` (indicating the 1st person singular) as in *pisz-e* '(I) am writing', or `-esz` (indicating the 2nd person singular) as in *pisz-esz* -

\(^1\) Since this study does not concentrate on phonology, and phonetic transcription was not necessary for data analysis, all of the examples of Polish verbs will be given using conventional, orthographic Polish spelling.
'(You) are writing'. The formative and inflectional stems of a verb exist concurrently if the verb is in the present tense or in the imperative mood, for instance: czytaj- in czytaj-a 'They are reading', or czytaj- in czytaj-my 'Let’s read'.

An important characteristic of the Polish verb is the presence of various formative affixes, either derivational or inflectional (Szymanek, 1993), which add to the morphological complexity. In order to make the morphological structure of a verb easier to explain, let’s analyze one morphologically complex verb rozbudowujecie 'You are building continuously' (example taken from Bidwell, 1972):

roz - budow - uj - e - cie
prefix - verb stem - stem forming suffix - present tense marker - 2nd person plural
continuously to build stem suffix are you
'You are building continuously.'

Overall, as was stated previously, the morphological structure of the Polish verb is very complex. From a developmental perspective, the major difficulty lies in the existence of two formative stems for each verb. However, once an appropriate stem is selected, the choice of inflectional endings is not expected to be problematic (Smoczyńska, 1985). Developmental data on acquisition of verbs in Polish, presented below, will show that the development of the verbal system is not impeded by this morphological factor.
Acquisition of the verb system

Very little information on acquisition of verbs in Polish is currently available. Some experimental studies were carried out in Poland (Mystkowska, 1970; Smoczyńska, 1972; Weist et al., 1984), but these did not examine children's acquisition of the verbal system in particular. Although there are many naturalistic data on some aspects of acquisition of Polish collected mostly by linguists who recorded and analyzed the speech of their own children (Wawrowska, 1938; Kaczmarek, 1953; Smoczyński, 1955; Szuman, 1955; Zarębina, 1964), such data are not systematic and generally are not very valuable from a psycholinguistic point of view. However, due to limited resources, they are the only sources of information relevant to this topic.

Based on the above naturalistic studies, Smoczyńska (1985) reports that there is evidence that at the one-word stage Polish-speaking children can produce verbs which are uninflected and have only pragmatic value. These are produced in the imperative or infinitive form in requests, e.g. *es* for *weź* '(You) take', and indicative form in the declarative contexts in the 3rd person singular, e.g. *gła* for *gra* '(He) plays'. Morphological development in general starts in the third month of the two-word stage, which is around the second year of age. Children as young as 1;6-1;9 are able to produce past tense inflections and perfective verb forms. Following the "frozen" syntactic verb form for the 3rd person singular at the one-word stage, e.g. *pcha* '(He/she) pushes', at the two-word stage the 2nd person singular of the imperative emerges, e.g. *daj* '(You) give', which is followed by the infinitive, e.g. *dać* 'to give'. Next, the verb forms of the
perfective future, e.g. zamknie '(He/she) will close', and the past tense (mostly perfective, e.g. zamknął '(He) closed', but also imperfective, e.g. zamykał '(He) was closing' emerge. Soon after that the analytic imperfective future is produced, eg. będzie zamykał '(He) will be closing'. By the age of 2;0 children also establish control over the gender agreement in past tense verbs. At the same time they are able to control case endings for nouns. Some children's morphological development may be slower due to phonological difficulties (e.g. Smoczyński, 1955; Smoczyńska, 1985). The most interesting fact related to the acquisition of verbs by Polish children is their precocious acquisition of tense and aspect (Smoczyńska, 1985), which will be discussed in the latter part of this chapter.

ASPECT: IMPERFECTIVE VS. PERFECTIVE

Overview

In spite of many controversial views on the nature of aspect in general, linguists agree that aspect refers to internal dynamic properties of situation such as completion, repetition and duration (Comrie, 1976). Some other dynamic properties of situation may also be coded in a language, for instance: prospectiveness (about to occur), ingressiveness (beginning), progressiveness (ongoing), terminativeness (ending), resultativeness (consequence), etc. (Weist, 1983).

Based on semantic distinctions, two major aspectual categories, called perfective [PFV] and imperfective [IMPFV] are distinguished in Polish. "The perfective aspect refers to a situation which is completed, i.e. a situation which has a beginning, a continuation and a
termination. The imperfective aspect is neutral but typically refers to an incomplete situation" (Weist, 1983, p. 86). "An imperfective situation may be one viewed as in progress at a particular reference point, either in the past or present, or one viewed as characteristic of a period of time that includes the reference time, that is a habitual. Imperfective forms are typically used in discourse for setting up background situations, in contrast with perfective forms, which are used for narrating sequences of events" (Bybee, 1985, p. 125).

In Polish, as in all Slavic languages, the category of aspect is fundamental in the verbal system. Although there are some verb forms which belong to both categories, for example kazać 'to order, to command', the distinction PFV : IMPFV is very transparent in the morphology of Polish verbs and the majority of verb forms have different forms for different aspects (Zagór ska-Brooks, 1975; Bidwell, 1972). The distinction between perfective and imperfective is coded by verb suffixes (e.g. the suffix -a- as in drg-a-ć [IMPFV], or -n(a)- as in drg-nq-ć [PFV] 'to vibrate, to tremble'), prefixes (e.g. prze- as in prze-czytać [IMPFV] as opposed to unprefixed czytać [PFV] 'to read'), or suppletion, where each of the forms is based on different stem (e.g. brać [IMPFV] : wziąć [PFV] 'to take') (Weist, 1983; Smoczyńska, 1985). Although the perfective verbs never occur with the expression of duration and the imperfective verbs never specify whether the event is completed or not, the selection of an aspe ctual form by a speaker mostly depends on perspective. If the situation is, in fact, completed, the speaker may mark it as such by using the perfective or may choose only to express its pastness by using the imperfective
verb form. If the situation is not completed, but occurred prior to the speech act, the speaker must refer to it only with an imperfective verb.

In addition to the semantic distinction underlying the dichotomy PFV : IMPFV, a verb may also be assigned to an aspectual category by using syntactic criteria (Zagórska-Brooks, 1975; Smoczyńska, 1985). Imperfective, usually unprefixed, verbs can be used only with a present meaning, e.g. szczotkuje [IMPFV] 'I am brushing'. However, they may also express futurity in analytic constructions of the future tense with the use of the auxiliary będę '(I) will', for example będę szczotkować 'I will be brushing'. Perfective verbs have only past and future forms. If the perfective verb is used in the present tense, it always has the future meaning, e.g. wy-szczotkuje [PFV form] 'I will brush'.

Morphologically, the expression of imperfective aspect normally requires the use of a simple unprefixed stem and the use of a suffix -i/-y- as in rzuc-ić 'to throw' or the -a-/ -ja-, as in wypis-a-ć 'to write out.' Other suffixes marking imperfectivity are -iwa-/ywa-, -wa-, -ja- (Zagórska-Brooks, 1975). The expression of perfective aspect typically requires the use of a prefix, a base verb and a suffix. The most common suffixes conveying perfectivity are -owa- as in namal-ował 'He painted' and -i- as in zakle-ił 'He glued in'.

---

1 Many consonant and vowel alternations are present in Polish verbs, depending on the phonological constraints. If two, three segments are used interchangeably, they will be presented with the use of a slash (/).
Sometimes the suffix -n(a) attached to the base verb is used to express perfectivity without the use of a prefix as in *krzyk-nq-l* 'He shouted.' However, most verbs can not be used perfectly without a prefix.

**Aspect and prefixation**

In spite of many controversial discussions arising around the issue of verb perfectivisation in Polish and other Slavic languages, linguists agree that prefixation is associated with perfectivisation, and frequently with semantic modification of the verb stem (Klemensiewicz, 1957; Piernikarski, 1969; Wróbel, 1978; Grzegorczykowa, 1984; Gladney, 1983). Although it is difficult to estimate the degree to which prefixes convey perfectivity and expand the meaning of a verb, some linguists argue that there are prefixed verbs in which the prefixes function only as a way of perfectivising them. Zagórska-Brooks (1975) for instance, suggests that if the perfective aspect alone is conveyed, the following prefixes are most likely to be the carriers of the perfectivity: *w-/we-, u-, za-, z-/s-/ze-, and wy-.* According to Grzegorczykowa (1984), the prefixes most likely to convey perfectivity are: *u-, z-/s-/ze-, za-, po-, wy-* (*wy-* is aspectual in the process verbs only). Mieczkowska’s (1985) list of perfectivising prefixes consists of the prefixes: *s-/ze-, po-, u-,* however she suggests that, depending on the derivative to which a prefix is attached, other prefixes can also convey perfectivity as the only notion. On the other hand, Maslov (1958) and Bondarko (1967) argue that there are no examples of prefixed verbs in which the prefix conveys aspectual information alone without adding further semantic information to the verb stem.
Acquisition of aspect

Unfortunately, there are as yet not many studies on the acquisition of aspect, which may be partially explained by the fact that linguistic expression of aspect varies among different languages and is interconnected with acquisition of tense. Nevertheless, there are some data indicating that children make a distinction between the basic aspectual properties of a situation, i.e. completed vs. incompleted activity, at an early age, and that expression of aspect precedes expression of tense. Gvozdev (1961) found that children acquiring Russian are able to make a clear distinction between perfective and imperfective aspects at around 1;10. At that age the present tense is always found in imperfective verbs. In past tense, on the opposite, children use verbs of both aspects. In addition, the most typical means of forming a perfective from an imperfective is the use of prefixes. Formation of perfectives by means of suffixes is less frequent and later to develop. Antinucci and Miller (1976) conducted a longitudinal study of the speech of seven Italian-speaking children aged 1;6 to 2;6 as well as examined the records of spontaneous speech of forty-eight Italian-speaking children aged 2;0 to 4;4 who were tested in the Berkeley Cross-Cultural Study of Language Acquisition. The aim of their study was to describe the development of the meaning and function of past tense forms in children’s speech. One of the findings showed that children aged 1;6 to 2;6 use past tense forms in their early tensed language, however these forms do not express temporal deictic relationships, but indicate aspectual distinctions. Bronkart & Sinclair (1973) conducted a study on temporal deictic and aspectual distinctions in French-speaking children aged 3 to 6, and concluded that before the age of 6 children are conceptually ready to code aspectual relations as opposed to
deictic relations which are conceptually more demanding. The data from Polish are more in line with Russian findings, suggesting that the distinction between perfective and imperfective aspect is acquired early in a child's language.

Studies from the acquisition of aspect in Polish (Weist, 1983; Weist et al., 1984; Weist & Konieczna, 1985; Smoczyńska, 1985) showed that the emergence of aspectual distinctions in Polish-speaking children's speech is estimated to occur around the age of 1;6 (Weist et al., 1984). In his first study related to aspect acquisition in Polish, Weist (1983) examined the comprehension of aspect and tense distinctions realized by either suffixation or prefixation. Two groups of children, one with an average age of 2;6 and the second with an average age of 3;6, were given a sentence-picture matching task. "Aspect pictures" contrasted completed vs. incompleted situations, and the sentences describing these pictures contrasted perfective with imperfective aspect conveyed by the means of either prefixation or suffixation, for example: z-jadł '(He) ate' [PFV, conveyed by the prefix z-] vs. jadł '(He) was eating' [IPFV, no prefix], or zamk-nął '(He) closed' [PFV, conveyed by the suffix -n-] vs. zam-y-kal '(He) was closing' [IPFV, conveyed by the suffix -y-]. Children's comprehension of the meaning of prefixes and suffixes was also examined during administration of the "tense pictures". Through the use of prefixation the tense pictures contrasted ongoing vs. anticipated situations and the tense shift was achieved by aspect shift, for example: buduje '(He/she) is building' [ongoing, IMPFV] vs. z-buduje '(He/she) will build' [anticipated, PFV]. In addition, through the use of suffixes the tense pictures contrasted the results of an action vs. anticipated action, for instance: kupiła 'She
bought' [result] vs. kupi '(He/she) will buy' [anticipated action]. The second type of contrasting pictures corresponded to perfective sentences only, with all suffixes conveying perfectivity. The results showed that by age 2;6 Polish-speaking children make distinctions between perfective and imperfective, with the completed situation being a salient component of perfective aspect and the incompleted situation being a salient component of the imperfective aspect. These distinctions were comprehended equally well despite the kind of linguistic means used (suffixes or prefixes). In the group of 2;6 years olds, 75% correct responses were found for both the aspect-prefix and the aspect-suffix problems. In addition, children also understood the distinctions between past and future indicated by past-nonpast inflectional shifts and perfective-imperfective aspect shifts; however tense distinctions were understood slightly better when tense was conveyed by suffixation than prefixation.

Weist & Konieczna (1985) enriched the studies on acquisition of aspect in Polish by examining young children's spontaneous speech. They audiotaped six children aged 1;7 to 2;6 (MLU between 1.51 and 1.91) during interactions with their caretakers. One of the goals of their study was to observe children's use of suffixes or prefixes as the means of expressing aspect. The results showed that children were able to make asectual distinctions between perfective and imperfective by using both affixes, and that they also contrasted imperfective vs. perfective meaning (completed vs. incompleted activity) within the class of prefixes and suffixes. In regard to the use of aspectual prefixes, the youngest child observed between age 1;7 and 1;9 used five prefixes contrastively, namely: po-,
prze-, z-/s-, za-, na- (to indicate aspectual differences prefixed verbs were contrasted with unprefixed verbs). The oldest child, observed between age 2;4 and 2;6, used only three prefixes contrastively: po-, z-/s- and wy-. The data indicate that children differ in regard to the timing of acquisition of aspectual prefixes. It needs to be remembered, however, that the number of subjects participating in Weist and Konieczna’s study was very small. In addition, the number of contrastive verb pairs produced (with perfectivity indicated by the production of a prefixed verb and imperfectivity by the production of an unprefixed verb) was also rather small (38 contrastive verb pairs for all subjects, with one child producing only 3 pairs). Due to a limited number of children and samples, it is difficult to predict children’s success rate on production of prefixed (perfective) verbs. It is also difficult to predict the timing of acquisition of all perfectivising prefixes, however, based on Weist and Konieczna’s study two prefixes, namely po- and z- (used interchangeably with s-) would be expected to be the first aspectual prefixes produced.

Weist’s findings that Polish-speaking children understand the concept of completed vs. incompleted activity and of past vs. future events by age 2;6, and that they also express such distinctions with the use of either affix, prefix or suffix, call into question one of the Slobin’s (1973) universal operating principles, the Operating Principle A: "Pay attention to the ends of words". This principle is based on data from many languages (e.g. English, Spanish, German, French, Czech, Hebrew, Hungarian) indicating that children pay attention to the ends of the words prior to paying attention to the initial parts of the words, and produce word endings earlier than word beginnings. Such a phenomenon can be seen
in children's omissions of initial syllables, especially if these are unstressed, however, evidence from some languages, for example Czech where all words receive initial stress, suggests that word endings are perceptually salient even if unstressed. Given this principle, and especially its developed version that "for any given semantic notion, grammatical realizations in the form of suffixes or postpositions will be acquired earlier than realizations in the form of prefixes and prepositions" (Slobin, 1973, p. 192), as well as the fact that in the prefixed verbs the suffixes receive the primary stress, while the prefixes receive the secondary stress, Polish-speaking children seem to acquire prefixes surprisingly rapidly.

Acquisition of the time concept

The apparently precocious acquisition of aspect in Polish and in other languages can not usually be discussed without referring to tense, to which aspect is very closely related. Talking about tenses, however, is impossible without referring to the development of the time concept, which seems to be a prerequisite for the acquisition of tensed verbs.

One of the most important findings from the study of the acquisition of the time concept comes from the work of Piaget. His research on the development of sensorimotor development demonstrated that during the first year of life infants gradually develop understanding of temporal order and duration (Chapman, 1988). Being able to reproduce actions in a sequence without being aware of such a sequence is the first stage in such development and it is followed by a primitive appreciation of temporal sequence in an
action-effect relationship. Following that stage children begin to understand simple sequences of events independent of action, but this operation requires memory involvement. This can be observed in the acquisition of object permanence. "When the child searches in A for the object he has just seen disappear in B, the practical memory of the action linked with position A still prevails over the memory of the sequence of the displacements" (Chapman, 1988, p. 114; Piaget, 1937, p. 41). In the next stage "the child can follow the successive hidings of an object at A and B and knows that once an object has been transferred from A to B, there is no longer any reason to search for it at A" (Chapman, 1988, p. 110). Finally, in the last (the sixth) of Piaget's stages of sensorimotor development, children overcome their dependence on direct perception and are able to represent sequences of events cognitively. This indicates that when children enter the preoperational period of their cognitive development (around the second year of their lives), they are already equipped with an abstract concept of time. With object permanence as one of the most important achievements, infants are able to recall prior events and to anticipate future events (Weist, 1984). This suggests that when children begin to talk they are conceptually ready to express temporal deictic relationships. The question remains as to when and with what kind of linguistic means they begin to express such abstract thoughts.

Antinucci and Miller (1976) examined the development of the meaning and function of past tense forms by Italian children aged 1;6 to 2;5. In spite of the fact that they based their assumptions on Piaget's findings, i.e. that by the time children enter the preoperational period of sensory-motor development they can conceptualize temporal relations, they
conducted a study which seems to contradict the Piagetian view. Following their observation that Italian-speaking subjects did not produce activity and state verbs (these two classes of verbs do not refer to events that result in an end state) in the past, they concluded that children of about 3 years still do not have the concept of time fully developed. They suggested that even when a young child uses past tense for situations not resulting in an end state, he indicates the aspectual distinction between finished and unfinished activity, not tense relationships per se. Based on these findings Antinucci and Miller (1976) argued that a preoperational child "lacks an abstract conception of time that would allow him to construct, between any two events X and Y, the relation Event X precedes Event Y, even when no other type of relation holds between X and Y" (Antinucci & Miller, 1976, p. 17).

Other studies on acquisition of temporal deictic relationships and acquisition of past tense verbs were conducted by diPaolo & Smith (1978) and Smith (1979) with children learning English. DiPaolo and Smith (1978) conducted an experimental study with twenty-eight children, aged 4;7 to 6;6, during which their subjects had to watch one of the experimenter's actions performed on different types of toys and describe what they had just seen. The stimuli consisted of eight actions, four with definite endpoints (e.g. closed box) and four without definite endpoints (e.g. flying). Smith (1979) analyzed spontaneous speech of seventeen children aged 2;7 to 5;8 and focused on their acquisition of temporal deictic reference, i.e. how they express the notions of Speech Time (ST), Reference Time (RT) and Event Time (ET). Data from both studies showed that by age 4, English-
speaking children use the past tense to talk about past events, even those without end states, which indicates that by then they have acquired the notion of pastness. Other researchers (Halliday, 1975a, 1975b; Sachs, 1980) reported that young children are able to talk about past events when they do not have appropriate linguistic means (Halliday’s 1;8 years old subject and Sachs’s subjects younger than 3 can be examples).

From studies on the acquisition of tense and aspect in Polish (Weist, 1983; Weist et. al., 1984; Weist & Konieczna, 1985) some further conclusions can be drawn about the development of the time concept and its linguistic realization. Twenty children, ten aged 2;6 and ten aged 3;6 participated in one of Weist’s (1983) experiments, the picture-sentence matching task. The results showed that Polish children are not only conceptually capable of making tense and aspect distinctions by age 2;6, but also that they do not experience difficulty with comprehension of temporal deictic relationships (the relationship between the speech act and some situation), which is expressed by tenses (by the present tense if a situation occurs during the speech time, by the past tense if it occurred prior to the speech act, and by the future tense if it occurs subsequently to the speech act). Having been shown a ‘tense picture’ and given a sentence to match that picture, they are able to discriminate between past and future and between present and future tenses. This finding confirms Smith’s (1979) argument that relatively young children are capable of temporal decentration.
Weist et al. (1984) conducted another study of Polish-speaking children, which aimed at investigating the evolution of children's capacity to represent temporal deictic relationships. Six children participated in the longitudinal part of that project, three aged 1;7 to 1;9, and three aged 2;0 to 2;2. The children were audio-recorded in their home environment while interacting with their mothers or fathers. Data were transcribed and verb phrases were classified as state (St), activity (Act), achievement (Ach) and accomplishment (Acc). Contrary to Antinucci & Miller (1976), who claimed that children younger than 3 years would use past tense only with end-result verbs, Weist observed that Polish-speaking children produced activity verbs (these do not result in an end state) in the past. In addition, his subjects were able to use future tense to express anticipation of a situation, for example: *Pomachamy mamusi* '(We) will wave to mom', said by Bartosz at 1;7 (example taken from Weist, 1984). In the cross-sectional part of this study, eighteen children were tested, nine at 2;6 and nine at 3;6. The experimenter acted out a sequence of two events and described the action using verbs in the present tense. Then the experimenter tried to elicit a response with the use of various elicitation questions providing an obligatory context for a past tense or a future tense response. The mean percentage of correct responses was 92% (past) and 66% (future) in the younger group and 99% (past) and 83% (future) in the older group. In the younger group, mean percentage was 70% of past tense initial responses for activity verbs and 57% for telic verbs (Acc and Ach). In the older group there was 94% of past tense initial responses for activity verbs and 91% for telic verbs. This finding contradicts Antinucci and Miller's argument that even the 3-year-old children can not express temporal deictic relationships. Weist estimates
that children acquiring Polish break out of their "here and now" communication system between 1;6 and 2;0. After that period they are capable of recalling a prior event and holding it in memory while talking about some components of the event. "From the outset, children make reference to the full spectrum of prior and subsequent situations including static as well as dynamic, activity (atelic) as well as telic, achievement as well as accomplishment." (Weist et al., 1984, p. 372).

Summary and predictions
Cross-linguistic data on the acquisition of aspect are consistent in that the most salient feature of an imperfective aspect is an incompleted activity and the most salient feature of a perfective aspect is a completed activity. They are also consistent in showing that expression of aspect may precede (Antinucci & Miller, 1976) or occur simultaneously with expression of tense (Weist, 1983; Weist et. al, 1984). None of the studies mentioned here suggest that the acquisition of aspect follows the acquisition of tense. Acquisition of tense and, in particular estimation of the age at which children show mastery in coding tenses in the morphology of their language, is viewed controversial. Polish data (Weist, 1983) suggest that children as young as 1;6 are already able to distinguish between completed and incompleted activity, and that 75% of children as young as 2;6 are capable of expressing such distinctions by using both suffixes and prefixes as appropriate means for expressing aspect, despite the fact that the suffixes, not prefixes receive the primary stress in the verb. In addition, by 2;6, most children are able to express temporal deictic relationships by using appropriate tenses. Since acquisition of tense and aspect is
considered precocious in the Polish verbal system, lack of expression of aspect and tense by children older than 2;6 would need to be attributed to other factors. According to Weist's study (1983) by 3;6 all Polish-speaking children should be capable of coding both aspect and tense, in the morphology.

PREFIXATION

Overview

The next dimension of verbs targeted in this study relates to prefixation. As was mentioned earlier, aspectual distinctions are coded in Polish morphology by means of suffixation and prefixation. In addition to conveying an aspectual meaning, most of the Polish prefixes are directly involved in expansion of the meaning of the verb to which they are attached. Although it is not very difficult to discuss the meaning (or meanings) of a prefix as an independent morphological unit, the combination of a prefix and a verb may be difficult to analyze. Since prefixation is one of the most intriguing parts of Polish, and Slavic morphology in general, and since the verbs targeted in this study are prefixed, there is a need to discuss prefixes in more detail, this time addressing their semantic meanings other than aspect.

Semantics of verbal prefixes (other than aspect).

There are 18 Polish verbal prefixes, 16 native (o-, na-, nad-, ob-, od-, po-, pod-, prze-, przy-, roz-, u-, w-, we(z)/we(s), wy-, z-/s-/s'-, za-) and 2 borrowed (re-, and de(z)-)
(Wróbel, 1978). The borrowed prefixes are usually used with borrowed verbs and will not be discussed in this study. Many of the native prefixes correspond in form and meaning to prepositions. The characteristic feature of prefixes is that, in addition to their primary meaning (the most frequent meaning) many of them convey other, very specific meanings depending on the particular prefix - verb combination. The knowledge of the most identifiable meanings of prefixes allows us in many instances to predict the meaning of a prefix - verb combination, but there is still much unpredictability in regard to the semantics of prefixes.

There are only a few prefixed derivatives in which the prefix does not seem to convey any new semantic notion, but functions only as an element of a word structure. The more usual case is for the prefix to have its own meanings. Prefixes often convey many meanings, and the meanings of many prefixes overlap, creating a difficult situation for a speaker who must know all of the meanings in order to match the semantic and syntactic requirements of the verb. Overall, the more precise the speaker wishes to be, the more difficult the task of choosing the most optimal prefix.

Gladney (1983) provides a concise summary of the meanings of the prefixes, according to which the following prefixes have the following meanings: do- 'as far as', na- 'onto',

1 The list of prefixes differs slightly in Mieczkowska (1985) and Gladney (1983), but the different number of prefixes reported can be attributed to the phonological variations of prefixes (e.g. the prefix z- will change its shape to s- before stems beginning with voiceless consonants).
nad-, o-, ob-, od- 'away from', po- pod- 'under', prze- 'through', przy- 'toward', roz- 'apart', u-, w- 'into', wy- 'out', wz- 'up', za-, z- 'together', z- 'off'. The meanings listed by Gladney are the basic ones, conveyed also by these forms when they function as prepositions. The wider variety of meanings that prefixes can convey can be better seen in a functionally oriented taxonomy. According to Mieczkowska (1985), meanings conveyed by prefixes can serve the following functions:

1) spatial-locative relation, e.g. na-kremować 'put cream on';
2) describing the degree of intensity of a feature to be acquired, e.g. u-błocić 'to really muddy something', przy-smazyć 'to fry a little';
3) indicating efficiency of an action, additional action, evolution of an action, depletion, or exhaustion of an action, e.g. do-pelnić 'to fill up';
4) indicating perfectivity, e.g. u-wrażliwić 'to make sensitive';
5) providing something with a new feature, e.g. u-brylantować 'to decorate with diamonds';
6) depriving something of a new feature, e.g. od-chować 'to get rid of weeds';
7) describing a method of an action, e.g. wy-słowić 'to express in words';
8) describing a transformative activity, e.g. prze-budować 'to reconstruct, to rebuild';
9) describing imitative/reproductive activity, e.g. s-kopiować 'to copy';
10) describing nullification of an activity, e.g. roz-supłać 'to untie (a knot);
11) describing an accumulative action, e.g. na-warstwić 'to arrange in layers';
12) describing determining activity, e.g. po-śpiewać 'to sing a little'.
There are other functions of the prefixes within most of the categories mentioned, but they will not be described here due to their infrequent and sometimes solitary occurrence.

The most common function of the prefixes is the spatial-locative function. It may indicate various relations between the subject and the object or between two objects. It may indicate that: 1) the surface of an object was covered (prefixes na-, o-, po-, u-, wy-, za-; 2) the inside surface of an object was covered (represented by the prefix wy-); 3) the direction is towards the center or inward (prefixes do-, na-, wy-, z-/s-/ze-, przy-); 4) the direction is directed to all sides (represented by prefixes o-/ob-, pod-, roz-, roz- with reflexive 'sie', wz-); 5) two objects are connected or come close to each other (represented by prefixes przy-, z-/s-/ze-); 6) the fastening of one object on the surface of another object (represented by the prefix przy-). The prefixes chosen for the study were u-, wy-, za-. As can be seen from the above description of locative function of prefixes, the three chosen prefixes convey spatial-locative information. However, since they also convey other semantic notions, it would be of interest to present all possible semantic functions of u-, wy- and za-.

Semantics of the prefix u-.

The most common feature of the prefix u- is information about the full acquisition of a new feature by an object, e.g. u-blościć 'to muddy'. In some derivatives the prefix u- seems to convey only perfectivity, e.g. u-przedmiotować 'to make a subject real, to make something a real thing'. The locative function of this prefix is less common and usually
indicates the coverage of the whole surface of the object or the part of the surface of the object with something. The activity can be purposeful, e.g. *u-brylańcić* 'to decorate with diamonds', or accidental, e.g. *u-mączyć się* 'to become floured'.

**Semantics of the prefix wy-.**

The spatial-locative function is conveyed by about 50% of all *wy-* prefixed verbs: a) indicating the direction of the event, i.e. from the centre or inside out (with the use of the instrument, or from the place, or to the place); or, b) indicating the purposeful coverage of the object (whole area or part of the surface) with something, e.g. *wy-perukować* 'to wig.' Other functions of the prefix *wy-* are: to convey aspeccual information, e.g. *wy-głodnić* 'to become very starved', to indicate about the acquisition of a certain feature, e.g. *wy-zgrabnić* 'to gain better shape', to indicate the way of performing the activity, e.g. *wy-slowić* 'to express by using words', to indicate that the object was deprived of a certain feature, e.g. *wy-naturzyć* 'to deprive of nature-like feature, de-nature something', to indicate that the event was ended and ended with the result, e.g. an object was created as in *wy-cyrklić* 'to draw a circle with the use of a compass', to indicate that something was achieved through the annulment/ undoing of something, e.g. *wy-krzaczyć* 'to get rid of bushes'.

**Semantics of the prefix za-**

The most common function of the prefix *za-* is the spatial-locative function, conveyed by about 40% of all of the *za-* prefixed verbs. When the prefix *za-* conveys this spatial-
locative information it may indicate: a) purposeful or accidental coverage of the outer surface of the object with something, e.g. za-daszyć 'to cover with the roof', b) fastening of one object with something on another object or inside another object, e.g. za-
lącuchować 'to fasten with the use of a chain', c) the direction of an action (something can be used along the length of an object as in za-rampować 'to barricade with the use of a bar, or towards the inside of the object, as in za-wagonować 'to load in the carriage', or towards the place as in za-niżyć 'to place something lower'. If the prefix za- occurs with the reflexive się 'self' it conveys the notion of a high force activity. In addition to the above meanings some prefixes inform about the result of an action and indicate that a new entity was created, as in za-suplić 'to knot'.

In spite of all of the above functions of prefixes presented, there are some examples of prefixes u-, wy-, za-, whose meanings can not be described by any of the above categories. For the purpose of this study the rare exceptions were excluded for the greater clarity of this complex issue of prefixation. Overall, literature review on prefixation presented here (Wróbel, 1978; Gladney, 1983; Mieczkowska, 1985) suggests that due to the high degree of overlapping meanings, the choice of a prefix may be difficult, especially in situations when the difference in a meaning between two or more prefixes is very subtle.

**Acquisition of locative expressions**

Expression of locative relations differs among languages. In Polish, for instance, the locative expression can have three parts: a verb prefix, a preposition, and one of the case
suffixes (locative, accusative, genitive or instrumental). A good illustration of such a complex locative expression can be seen in a sentence *Włoże też do prądu* '(I) will also put it into the outlet', spoken by a child of 2;4 (Weist, 1985):

\[
\text{W} - \quad \text{loż} - \quad e \quad \text{też} \quad \text{do} \quad \text{prądu}
\]

locative pfx - verb stem - 1st person adverb preposition noun (Gen)

in put also to current

'(I) will also put it into the outlet'

Research (Johnston & Slobin, 1979; Johnston, 1988) shows that in spite of using different linguistic means (e.g. prepositions, prefixes) for expressing locative relations, there is some consistency in acquisition pattern among children who learn different languages. The cross-linguistic data from English, German, Hebrew, Italian, Japanese, Portuguese, Russian, Serbo-Croatian, and Turkish (Johnston, 1988) show that some locative terms seem to be learned at certain ages and in a predictable order. For example, the locative term "in" was noticed to be acquired as the first locative expression in six languages. It is expected to be understood by the age of 2, and produced between 2;2 and 2;4. Some other locative terms, for instance "between", was understood by children aged 3;0 to 3;6 (data from four languages) and expressed between the age of 3;4 to 4;0. This predictable order of acquisition of locative relations observed in children learning many languages suggests that nonverbal conceptual development plays a major determinant role in the acquisition of locative relations (Johnston, 1988). However, this is not the only determinant of acquisition of locatives. Despite the pattern of developmental similarity,
"there are language specific differences in the rate and sequence of development of particular linguistic forms" (Slobin, 1982, p. 161). Two of the major factors contributing to language-specific differences in acquisition of locatives are lexical diversity and homonymity. "If there are many overlapping terms, the child can not be sure of the precise meaning differences between terms, resulting in false hypotheses and prolonged patterns of confused acquisition" (Slobin, 1982, p. 162). Also, if some surface forms (e.g. "back" and "front") are homonyms, encoding relations to featured and nonfeatured objects with no difference in surface linguistic form, the mapping between semantic form and surface structure may be difficult.

**Acquisition of verbal prefixes**

Unfortunately, there was no study found on the acquisition of verbal prefixes in Polish; nevertheless, general information about this topic can be drawn from studies examining production of prefixed verbs in Polish. These studies were conducted by Chmura-Klekotowa (1967, 1968), Weist (1983), Weist et al. (1984), and Weist and Konieczna (1985). Findings from these studies will serve as the main source of information regarding the notions children convey through verbal prefixes both aspectual and locative, and the productivity of these prefixes in the speech of young children.

**Aspectual**

Weist's (1985) data showed that children aged 1;6 to 2;6 years used the nine following prefixes (of 16 possible) to indicate aspect: po-, z-/s-, za-, na-, u-, prze-, wy-, and o-. 
Prefixes *po*- and *z-/s*- were the most frequently used (25.5% and 42.0% respectively) to convey this aspectual notion. The prefixes *do*-, *nad*-, *pod*-, *roz*-, *od*-, *w*-, *w(e)s/w(e)z*- were not used to make the aspectual distinction between perfective and imperfective; however they occurred in other contexts that were not analyzed.

**Locative**

Data on acquisition of locative prefixes (Weist & Konieczna, 1985) are limited to the number of subjects (six children aged 1;7 to 2;6) and type of prefixed verbs produced by the subjects (the prefixes analyzed were those that were attached to the verbs of motion and placement). For the verbs of motion, the agent was the focus of a change in location, for example: *pójść* vs. *przyjść* 'to go' vs. 'to come'. For the placement verbs, the patient was the focus of a change, for example: *wlać* vs. *wyłać* 'to pour in' vs. 'to pour out'. Nine of the possible 15 locative prefixes (of the 16 native prefixes only one *w(e)s-/w(e)z*- is not used to make locative distinctions) were used with these verbs. As early as at 1;7 children used the prefixes *po*- and *przy*- to talk about the beginning and the end of motion, prefixes *w*- and *wy*- to talk about the movement or placement in/out of a confined area, prefixes *do*- and *od*- to talk about the motion to a goal and away from a starting point, and *z-/s*- and *pod*- to talk about the movement up or down. Lack of the use of the prefixes *za*- 'moving behind', *na*- 'moving upon', *ob*- 'moving around' or *prze*- 'moving through' is indicated by Weist as a sign of conceptual difficulties with understanding these relations.
Summary and predictions

Although many attempts have been taken to investigate how children develop adult semantic knowledge, "semantic development has not been fully described or unified by any single theory" (Berko-Gleason, 1985, p. 131). Research on many languages provided support for the hypothesis that semantic development (for instance, the development of locative expressions) depends greatly on conceptual development. Therefore, if a child has difficulty with expressing a particular semantic notion, it may be indicative of his lack of conceptual readiness. Research on Polish (Weist & Konieczna, 1985) suggests that despite the fact that in some instances full locative expression can consist of three separate morphemes, children who are conceptually ready to express such a notion are likely to be successful with using all of the three parts. Based on this line of argument, I may suggest that if a locative expression is conveyed by a prefix, children who fail to choose an appropriate prefix for meaning expansion are likely to show signs of conceptual immaturity. However, I must also consider other more language-specific reasons for failing to choose an appropriate prefix. As was mentioned, some Polish prefixes convey the same semantic notions, making the choice of a prefix more challenging. Also, the difference in meaning conveyed by two different prefixes may be so subtle that it may not, in fact, alter the interpretation of the prefixed verb, and both prefixes may be considered appropriate for a particular verb by a native speaker of Polish. In some instances of prefix use, only a thorough semantic analysis can point to the better prefix choice. In general, it seems reasonable to believe that if Polish-speaking children have difficulty with choosing a
prefix, the "error" will be related to semantic notions other than aspect and will stem from conceptual difficulty or from the challenges of semantic mapping.

DENOMINALIZATION

Overview

Denominal derivation is widely used in many languages, and researchers have reported the production of denominal verbs by children who have just begun to use action words (Clark, 1982; Bowerman, 1974). Denominal derivation is a very common process in Polish and, as in all Slavic languages, consists of two derivational levels. The first level of denominal derivation is necessary and consists of the conversion of a noun into a verb through the use of verbal suffixes. The second level, prefixation, is not necessary, but is very frequently observed in creating denominal verbs. There are 5 verbal suffixes (-a-, -e-, -i-, -n(q)-, -owa-, with their phonological variations) and 16 verbal prefixes (do-, na-, nad(e)-, o-, ob(e)-, od(e)-, po-, pod-, prze-, przy-, roz-(e)-, u-, w-, wy-, z-/s/-ze-, za-) used in the production of denominal verbs (Dulewiczowa, 1981). Prefixed denominals are very productive in Polish and can be divided into three semantic categories depending on the class of verbs a denominal belongs to (e.g. process verbs, causative verbs). Characteristic features of denominal derivation in Polish and acquisition data will be presented in this section.
Suffixation and denominal derivation

The first and the most important level of denominal derivation consists of the conversion of a noun into a verb, which is done with the use of specialized suffixes: -e- (e.g. pleśń 'mould'; pleśni-e-ć 'to mould'), -i/-y- (e.g. chmura 'a cloud'; chmurs-y-ć 'to cloud, overcast'), -owa- (e.g. mur 'a wall'; mur-owa-ć 'to build (wall) in brick, in stone') and sometimes -a- (e.g. dziób 'a beak'; dziob-a-ć 'to peck, to 'beak') and -n(u)/-n(a)- (e.g. krzyk 'shout'; krzyk-na-ć 'to shout') (Dulewiczowa, 1981). The suffixes -owa- and -i- are especially productive. The suffix -owa-, plays an important role in creating denominal verbs which take either a direct object or a qualifying phrase, eg. as in szczotk-owa-ć 'to brush', farb-owa-ć 'to dye'.

Prefixation and denominal derivation

The base verb is the product of the conversion of a noun into a verb and as such it becomes the base for the next, the prefixal stage of derivation, which does not change the grammatical class of a new derivative, but frequently modifies or even changes the meaning of the new word. The structure of prefixed denominal verbs is more complicated than the structure of an unprefixed verbs, since both the stem and the prefix complement each other semantically. As was previously mentioned, sixteen prefixes participate in the denominal derivation. In addition to bringing in their specific meanings, they also add to a verb the notion of perfectivity.
object (e.g. za-ciemnić (pokój) 'to darken (a room)'). These verbs are usually derived from adjectives, however some are derived from nouns (e.g. u-przedmiotowić 'to make a subject real').

The third category of denominals is the category of verbs with built-in arguments. The derivational process for these verbs leads to a synthetic way of describing semantic relations; both a predicate and an argument in one of the thematic (semantic) roles are combined in one lexical item. The noun represents the argument and serves as the formative stem of the derivative, while the thematic verb suffix (usually -owa-, -i-, and rarely -izowa-, -a-) is a predicate indicator and functions only as a global marker of the verb class. Based on the analysis of the possible relations which can occur between arguments, it is not difficult to assign thematic (semantic) roles to these arguments. Typically these would be the roles of: 1) an instrument, 2) an object, 3) a result, 4) location, place, 5) time of the event. All denominals in this group are transitive and require the use of an agent’s name and the object’s name in the Accusative.

Frequency of occurrence of prefixes in derived verbs

The overall frequency of occurrence of the various prefixes in denominal verbs can be estimated from study by Mieczkowska (1985). The number of occurrence of each prefix was determined by collecting prefixed verbs from dictionaries of Polish (e.g. Doroszewski, 1958-1968; Grzegorczykowa, 1969; Szymczak, 1978-1979, 1981) and from casual speech of everyday life. The overall number of different prefixed denominal verbs reported by
Mieczkowska was 1,128. It needs to be noted that Mieczkowska’s definition of denominal verbs also includes verbs based on adjectives. For the greater clarity of this study, the deadjectivals will not be given much attention unless necessary.

The majority of prefixes found in denominal and deadjectival forms were used in causative structures (456 times). Prefix \textit{u-} was found to be highly associated with this group of verbs (was used 248 times in this category). Other prefixes associated with this category were: \textit{z-/s-/ze-} (69), \textit{roz-} (50), \textit{o-/ob-} (32/7), \textit{wy-} and \textit{za-} (both used 12 times). Prefixes: \textit{pod-}, \textit{w-}, and \textit{zde-} were not used in this category at all.

The category of denominals with a build-in argument was the second in which the prefixes were used (437 times). Fourteen of the 16 native verbal prefixes form this category of denominals, namely \textit{do-}, \textit{na-}, \textit{o-/ob-}, \textit{od-}, \textit{po-}, \textit{pod-}, \textit{prze-}, \textit{przy-}, \textit{roz-}, \textit{u-}, \textit{w-}, \textit{wy-}, \textit{za-} and \textit{z-/s-/ze-}. The most common prefix found in this category was the prefix \textit{u-} (it occurred 70 times), then \textit{wy-}, \textit{za-}, \textit{od-} (each appearing 58 times), \textit{o-/ob-} (57/11) and \textit{roz-} (55). The prefixes \textit{nad-} and \textit{wz-} did not appear in this category at all. Prefix \textit{po-} which is occurring very frequently in Polish, was found only 3 times (Mieczkowska, 1985). Wróbel’s (1984) list of prefixes found in this category of denominals excludes prefixes \textit{nad-}, \textit{po-}, \textit{z-/s-/ś}, and \textit{w(e)z-/w(e)s-}.
In the category of process denominals prefixes were used 235 times. The most common prefixes used in this category were: z-/s-/ze- (59/4/10), u- (57), roz- (47), o-/ob- (17/6). The following prefixes were not used in this category: do-, na-, po-, pod-, w-, wz-, zde-.

Overall, the most frequent prefix appearing in both the denominal and deadjectival derivatives was u- (it occurred 375 times in all examples), followed by o- (106), then by wy- and za- (each appearing 83 times). The most frequently appearing prefixes in this category were: u- (70), wy-, za-, od- (each 58 times), o- (57). Based on the frequency of occurrence of prefixes in denominal (and deadjectival) derivatives, it is reasonable to believe that if the frequency is a crucial factor in acquisition of prefix meaning, these most frequent prefixes should be acquired first.

**Regularity and productivity of prefixed denominals**

The most productive group of prefixed denominals is the one in which the noun takes a place of an argument to which a semantic function of an instrument is assigned, and in which the verbal suffixes, usually -i-, and -owa-, function as predicate markers (Mieczkowska, 1985). This category is also most regular of the three categories of denominal verbs. Semantically, it can be represented by the formula: X acts on Y with the use of Z, where the predicate embodies the action between the agent and the instrument. The causative types of denominal verbs which are motivated by adjectives are regular, but those motivated by nouns are not. For instance, there is not such a verb as nożować 'to knife', but there is a verb pilować 'to saw'. The process and state verbs are also...
also characterized by lack of semantic regularity since in many instances the denominal verb may refer only to some attributes of the formative nominal and not to the basic meaning of the stem. For example, the verb *zbaranieć* based on the noun *baran* 'a sheep' does not mean 'to become a sheep', but it is an impolite form of saying "somebody behaves as silly as a sheep". In regard to structure, most of the prefixed denominals have a base in already existing prefixed deverbals and copy their structure into the prefixed denominal formations, e.g. the verb *wy-korzenić* 'de/un-root' was probably based on the verb *wy-plenić* 'to exuberate.'

Overall, the category of denominal verbs with built-in arguments is the most regular and the most productive of the three, and there might be the possibility that such regularity and productivity could be important factors in the production of denominals of this type. It needs to be remembered, however, that such a degree of productivity and regularity is not seen across all examples in this category.

**Acquisition of denominal verbs**

The process of changing a noun into a verb is well established in English and seems to be learnt very early in the language acquisition process. Its relative ease may be contributed to the fact that in many instances the conversion of a noun into a verb does not require the use of any of the specialized affixes which must be used in other languages to indicate the change of a grammatical category between the base word and a new derivative. English-speaking children frequently use nouns for verbs to fill in gaps in their lexical repertoire
in situations where the entity depicted by a noun is involved in the action (Clark, 1982; Gentner, 1978). Although in some instances the English-speaking children do not have to use any affixes to indicate the change of a grammatical category, e.g. when they "convert" a noun 'glue' into a verb 'to glue', the data show that children as young as 3 are very sensitive to the grammatical class of a word and aware of the fact that nouns can serve them as precise means for talking about actions (Clark, 1982).

Another interesting phenomenon is that children are not only more creative in coining denominal verbs than deverbal or deadjectival verbs, but also are most innovative in certain categories of denominals, namely: 1) instrument verbs, e.g. "He is keying the door", 2) locatum verbs, e.g. "She pillows me", and 3) characteristic activity verbs, e.g. "Make it bell" (Clark, 1982). Frequent innovations in these specific categories are also observed in French and German (Clark, 1982) and can be attributed to three main factors. First, since young children's lexical repertoire includes more nouns than verbs and other parts of speech, the nouns are most available for conversions. Second, these categories of instrument, locative and characteristic activity verbs are very salient perceptually and are frequently occurring in a language (especially the category of instrument and locative). Third, since the denominal verbs allow information about the action and the object involved in the action to be conflated and thus expressed simultaneously, therefore they do not require the use of the sophisticated syntactic skills. Surprisingly, children tend to create new verbs in the frequently occurring categories in which, in fact, they have some well-established verbs, and not in categories less frequently found in speech (location,
goal, agent, experiencer, source, duration, others). Adults, on the other hand, create new verbs if their repertoire of well-established words does not include a specific item. Such findings suggest that the acquisition of denominal verbs may be orderly, may depend on the verb category, and may not be constrained by adult denominal verb conventions. According to Clark there is evidence that children use a rule for producing the denominals. She proposes that "the main evidence for this rule is that children produce a large category of innovative denominal verbs, i.e. characteristic activity verbs for which they lack any model in adult speech" (Clark, 1982, p. 424).

Not much data on acquisition of denominal verbs in Polish were found. Some information can be deduced from Chmura-Klekotowa’s studies on the production of innovative neologisms. She examined 5000 of innovative words in children aged 2 to 8 years. Her data provide evidence for young children’s capability to produce innovative denominal verbs at the age of 2;3 and, what is of interest here, prefixed denominals at the age of around 2;5. She suggests that children produce novel words on the basis of the ones present in their vocabulary, therefore there is a possibility that by then children have acquired some grammatical denominals which serve as models for their innovations. This line of argument would be consistent with Clark’s findings that by age 3 children coin denominal verbs to express notions for which they do not have appropriate verbs.
Summary and predictions

Research shows that not only denominalization is a very productive derivational process in many languages, but also that across languages the same category of denominal verbs, i.e. with a built-in argument, where argument functions as an instrument, is the most frequently represented, and that children as young as 2 are able to coin them. Data from Chmura-Klekotowa (1967, 1968) on innovative words in Polish-speaking children seem to be consistent with Clark’s (1982) findings. Lexical creativity in regard to production of denominal verbs seems to suggest that denominalization is not a difficult process even for young children. If that is the case, it can be expected that the rule used for production of innovative denominal verbs might be seen in children’s production of denominals in this study. It also seems reasonable to expect that children older than 2 would be able not only to coin a denominal verb but also prefix it. They might have difficulty with choosing an appropriate prefix, however, they should not experience difficulty with indicating aspectual distinction. This means that even though they may not choose a targeted prefix, the prefix (any of the 16 aspectual prefixes) should be attached to a denominal verb as a means of conveying perfectivity.

CAUSALITY

Overview

The last dimension which needs to be discussed in this chapter concerns causality. Causation is a multifaced domain involving diverse kinds of knowledge and can be defined differently, depending on one’s theoretical perspective. In general, psychologists and
philosophers make a distinction between a broad and a narrow meaning of the term "cause". In its broad sense, this term merely means explanation of a phenomenon, and in this sense does not require pointing to an observable agent, event or result (eg. "It's noon because the sun is directly overhead", from Ammon, 1981). The idealized narrow definition of causality is mechanistic and involves the presence of an agent or an object which initiates an event that results in an effect (e.g. "Joe hit the ball with the baseball bat causing the ball to pop fly", from Ammon, 1981). This latter definition is not a comprehensive definition of causality, but it will serve as a good description of the causal events used in this study.

Acquisition

One of the main prerequisites to understanding and talking about causation is to make the association between performing causal actions, e.g. pulling something to make it move, and representing them mentally in a more general fashion. In order to understand, and then talk about causality, a child has to acquire knowledge about different types of causal events, develop many concepts and inferential abilities and acquire linguistic devices which would help him convey causality in words.

Before the child is able to express causation in a more or less adult form, with the use of explicit causative verbs, he is able to convey causative meanings in transitive situations as early as at the two-word stage (Bowerman, 1974; Antinucci & Parisi, 1973; Parisi, 1974). Children between 2;6 to 3;6 are able to describe causal events focusing on the final
state by using general verbs such as "make", "get", and "put". According to Bowerman (1974) periphrastic causatives (e.g. "He made her go and get some milk") are precursors to explicit lexical causatives (e.g. "He sent her to get some milk") and they always enter the child's lexicon before the lexical causatives. Clark (1982) suggests that periphrastic forms and conflated forms are not related derivationally and may appear in children's speech independently. Children as young as 3 may express causality by either lexical terms or by periphrastic causatives, and linguistically advanced children may use even more complex causal expressions (Bowerman, 1974).

The examination of causal understanding and causal expression in preschool children shows that despite their ability to talk about causal actions they tend to pay attention only to certain features of the causal event and miss some others. They can not provide explanation for causal phenomena, show no attempts to reconcile anomalies, focus on practical results or on the final state (Bronckart & Sinclair, 1973; Gentner, 1978), pay no attention to the details of the events, and use motivational explanation for physical phenomena (Blank, 1975). Those children who try to explain causal phenomena confuse the causal explanations appropriate for either animate or inanimate subjects. They also frequently describe what they perceive which is what they expect (Ammon & Slobin, 1979). The development of understanding and expressing causality does not end in the end of the preschool years, but continues through the lifespan with new aspects of causal situations being paid attention to and expressed with more sophisticated linguistic means.
Linguistic expression of causality must take into consideration the specific language in which the causality is being expressed. Some languages have productive (periphrastic) and lexical forms for expressing causation (eg. English), while others have only lexical forms (eg. Polish). If the language has both forms, then the periphrastic form can express "directive" causation where the causee is a volitional (agentive) entity and the causer is an agent giving directions to the causee (eg. "Mary made him laugh", Shibatani, 1976) or "manipulative" causation, where the causer physically manipulates the causee in effecting the causal event and the causee is a non-volitional entity (eg. "Mark pushed John", Shibatani, 1976). Lexical forms can express only "manipulative" causation. Polish, however, does not have periphrastic form, therefore the directive and manipulative causal events are expressed through the lexical forms.

Summary and predictions

Lack of data on acquisition of causal expressions in Polish does not interfere with making predictions on whether or not Polish speaking children would be able to understand causal actions. Since Bowerman (1974) suggests that English-speaking children are able to express causal meanings as early as around their second year of life, and since Clark (1982) suggests that by the age of 3 children are able to convey causal meaning, there is a basis for making a claim that by age of 3 Polish children will also be able to express causality, however, it is difficult to predict what linguistic means they will use.
GENERAL SUMMARY

In summary, acquisition of prefixed denominal causatives demands that speakers be competent in many linguistic and non-linguistic domains. On the linguistic level, they should be competent in derivational operations, i.e. suffixation to change grammatical class of a noun, and prefixation to indicate aspect and expand the meaning of the stem. On the non-linguistic level they should be capable of comprehending concepts of causality, locative relations, aspectual properties of a given situation (especially its completion or lack of completion) and others. The literature suggests that children are capable of performing these operations by the time they are 3-years-old. Evidence for that is provided by their production of innovative denominal verbs (Clark, 1982; Chmura-Klekotowa, 1967, 1968), causal verbs and causal expressions in general (Bowerman, 1974), comprehension of aspectual (Weist, 1983; Weist et al., 1984; Weist & Konieczna, 1985) and locative (Weist & Konieczna, 1985; Johnston, 1988) properties of situations. There is a gap in the current literature, however. Although each of the operations required for production of prefixed denominal causatives have been studied separately, and there is evidence for their early acquisition, none of the studies discussed in this chapter combined them in one. In addition, none of the denominal verbs and prefixed denominal verbs studied by Clark (1982) and Chmura-Klekotowa (1967, 1968) were produced in an experimental context, which causes some doubts as to the completeness and productivity of the child's underlying knowledge.
THE CURRENT STUDY

The purpose of this study is two-fold. First, it was designed to investigate the pattern of acquisition of prefixed denominal causatives. An elicitation method was chosen for examining production of these structures. In addition, a nonsense category of denominal verbs was designed to exclude the possibility that production of some denominals might be a function of rote memorization (Bybee, 1985). Second, I was interested to see what factors are important in production of prefixed denominal causatives. The literature suggests that children are able to express causality, aspectual and certain locative properties in early stages of language acquisition, and therefore can be considered to have met basic conceptual prerequisites. If the conceptual requirements for the targeted verbs are met, it should be easier to observe the role of linguistic variables, such as derivational processes and semantic mapping. Based on the literature, non-linguistic factors indeed seem to play a less important role in acquisition of the targeted structures than linguistic factors. Some research suggests that acquisition of derivational morphology continues well into school years (Tyler & Nagy, 1989) and is greatly influenced by schooling. If a derivational task involved some other linguistic demands (e.g. semantic and syntactic, as is the case in this study), performance on it may be less successful than performance observed in English-speaking school children and also less successful than suggested by Clark's data on production of innovative denominal verbs of children younger than 3. Despite Clark's claim that young children seem to have a rule for production of innovative denominal verbs, the generality and degree of mastery of this rule remains unclear. The aim of this study is to provide data on children's acquisition of a rule which would enable
them producing prefixed denominal causative verbs on request. As was stated above, two questions are asked in this study: 1) What is the course of acquisition of prefixed denominal causatives?, and 2) What factors account for the productive use of these structures?
CHAPTER TWO

METHOD

OVERVIEW

This study was designed to answer two questions concerning the acquisition of prefixed denominal verbs of a causative type in Polish. The first question referred to the course of acquisition of these structures. The second question addressed the factors influencing their acquisition. The data to answer these questions were gathered by asking children of different ages to describe videotaped enactments of causal events.

SUBJECTS

The majority of subjects were recruited through one daycare, two preschools and two elementary schools in Kraków, Poland. Three of the youngest children were not in any kind of daily child care and stayed at home with their mothers. Their parents were friends of the examiner. Prior to the experiment an initial letter was sent to the school and the preschool principals, outlining the project activities and procedures of the study. After the schools agreed to participate in the experiment, the consent forms were distributed to parents of children who met the age requirements (See Appendix A for a copy of the letter and consent form). The management of the school, preschools and daycare, as well as the parents, were very supportive of the experiment. The teachers, who were asked for recommendations, were also very helpful in suggesting appropriate candidates.
Eighty children participated in the screening sessions (described in more detail later in this chapter), which were planned to identify those children whose speech was intelligible, who were willing to talk, and who were able to show some productive skills in the area of inflectional and derivational morphology. All of the children spoke Polish as their first language. Each was interviewed by the examiner who was also a native speaker of Polish.

As a result of the screening sessions, forty-eight children, aged 2;8 to 10;6 were chosen to participate in the further part of the study. None of them was identified by a speech pathologist or a teacher as being delayed in language development. Some developmental speech errors were seen in the speech of a few children, but these were judged to not interfere with the demands of the experimental task.

Table 1. Mean Age For the Four Experimental Groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Ss</th>
<th>Mean CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (3's)</td>
<td>12</td>
<td>3;6</td>
</tr>
<tr>
<td>Group 2 (5's)</td>
<td>12</td>
<td>5;5</td>
</tr>
<tr>
<td>Group 3 (7's)</td>
<td>12</td>
<td>7;4</td>
</tr>
<tr>
<td>Group 4 (9's)</td>
<td>12</td>
<td>9;6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48</strong></td>
<td><strong>6;5</strong></td>
</tr>
</tbody>
</table>
The children were divided into four groups, twelve children in each group, according to age. Group 1 (3’s) consisted of children whose chronological age was between 2;8 and 4;6. Group 2 (5’s) consisted of children whose chronological age was between 4;9 and 6;6. Group 3 (7’s) consisted of children whose chronological age was between 6;8 and 8;1. Group 4 (9’s) consisted of children whose chronological age was between 8;6 and 10;6. Mean age in years for the groups is presented in the Table 1.

SCREENING ASSESSMENT

All children who participated in the study underwent a screening assessment consisting of the following four tasks:

1) Informal play-based language sample. Children were asked to talk about home, family, past holidays or their favourite story. Those children who made speech errors that could not be explained by the developmental sequence of sound acquisition, who had poor intelligibility or apparent delays in linguistic skills, or who would not participate in a conversation despite a variety of prompts, were excluded from the study.

2) Naming task. Children were shown six photographs and asked to name them. This task was designed to elicit the morphemes needed for the experimental task, namely: wy and za. Wy- and za- were two of three prefixes being tested. The other prefix tested was u-, which did not have to be elicited since it does not differ from the vowel u, which is acquired very early. The aim of this task was to ensure that a child’s phonetic repertoire included these phonetic combinations.
Three pictures of objects beginning with za were shown: 1) zapatka 'a match', 2) zabawki 'toys', 3) zasłona 'a drape'. The three other pictures showed objects beginning with wy: 1) wycieraczka 'a doormat', 2) wysoki (człowiek) 'a tall (man)', 3) wystawa 'a window show'. The picture of the match and the window show were judged to be the easiest and the most difficult respectively; they were therefore presented first and last, respectively. The remaining pictures were presented in random order. Children who named at least two of the six pictures, each beginning with a different syllable, participated in the next part of the preliminary assessment.

3) Word derivation task. This task provided the experimenter with a rough estimation of the children's abilities in regard to derivational and inflectional suffixes. Eleven items were presented to elicit suffixes distributed as follows: 3 diminutive suffixes, 6 agentive suffixes (3 for the feminine and 3 for the masculine gender) and 2 adjectival suffixes. A list of all items, organized according to the order of presentation, can be found in Appendix B. Suffixes were elicited by asking questions. For example, if the expected answer was mal-arz 'a painter', where the -arz was the agentive suffix in the masculine gender, the question asked would be: "What do you call a man who paints?" If the expected answer were dziewczyn-ka 'a little girl', where the -ka was the diminutive suffix, the question asked would be: "What do you call a little girl?" Since this task was used as a screening measure only, subjects were scored on a pass/fail basis. The criterion for a pass in the 5's, 7's and 9's was provision of at least two correct answers for the items administered. An exception was made for the youngest children, the 3-year-olds, who were difficult to test
with this task due to compliance and attentional difficulties. In those instances when they failed to provide any correct answer but participated well in other parts of the preliminary procedures, their morphological skills were assessed informally by analyzing their language samples. It was thought that children who would not produce any affixes in spontaneous speech would not meet the requirements of the experimental task. Table 2 shows the results of this task.

Table 2. Mean Number (and Proportions) of Correct Responses in the Derivational Task by Age.

<table>
<thead>
<tr>
<th>Suffix Category</th>
<th>3's</th>
<th>5's</th>
<th>7's</th>
<th>9's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflectional</td>
<td>.8</td>
<td>2.0</td>
<td>2.9</td>
<td>3.0</td>
</tr>
<tr>
<td>(N=3)</td>
<td>27%</td>
<td>66%</td>
<td>97%</td>
<td>100%</td>
</tr>
<tr>
<td>Derivational</td>
<td>.9</td>
<td>4.4</td>
<td>5.7</td>
<td>5.9</td>
</tr>
<tr>
<td>(N=8)</td>
<td>10%</td>
<td>55%</td>
<td>70%</td>
<td>74%</td>
</tr>
<tr>
<td>Total</td>
<td>1.8</td>
<td>6.4</td>
<td>8.6</td>
<td>8.9</td>
</tr>
<tr>
<td>(N=11)</td>
<td>18%</td>
<td>58%</td>
<td>78%</td>
<td>81%</td>
</tr>
</tbody>
</table>

4) Phonotactic task. Children were asked to repeat after the examiner a list of sixteen words which differed in number of syllables, consonant-vowel combinations within a syllable, and level of phonological difficulty. The items were matched phonotactically with the items given in the experimental task. The shortest word was a 2-syllable word ku-piec and the longest word was a 5-syllable word au-to-ma-ty/cz-ny (this word can be divided into syllables either way: a) au-to-ma-ty-czny, or b) au-to-ma-tycz-ny). A list of all items can be found in Appendix C. If, after the verbal presentation of a word by the examiner,
a child made a pronunciation error, the word was presented again, and the child had an opportunity to repeat it for the second time. Children who could not imitate any of the 5-syllable words after two trials, were excluded from the study.

Overall, the screening sessions enabled the experimenter to choose the subjects for the experimental phase. A pool of approximately 55 subjects qualifying for this study was established; 15 children were excluded from this study due to their poor language skills, and/or phonological difficulties seen in their language samples, picture-naming task and phonotactic task, and 10 children were excluded after the administration of derivational part of the screening task. Eventual selection of subjects proceeded randomly until the needs were met.

EXPERIMENTAL TASK

Overview

Forty-eight children who met the screening requirements participated in the experimental phase of the study. Twelve short (1.0-1.5 minutes) video scenes each portraying a different causal event, were presented individually to each child. If the experiment took place in a school or in a preschool, no other persons, except for the examiner, were present in the examining room. When the experiment took place in children's homes, parents were allowed to stay in the room, but they were instructed not to provide any help for their children. The video scenes were shown separately and in a predetermined order to each child. After the presentation of each scene the examiner asked the child the same question:
"What did she/he (the Agent in the video scene) do?" In case of a performance breakdown, specific verbal cues (described in greater detail in the later part of this chapter) were offered to help a child with the task.

**Item design**

**Video scenes**

The experimental task was designed to evaluate children’s ability to derive causative verbs from a given word stem, either a noun or a verb. The video scenes were used as stimuli for elicitation of prefixed **denominal** causatives (9 items) and prefixed **deverbal** causatives (3 items). The prefixed deverbal causatives were expected to be easier to produce, and were included as a reference point for performance on the prefixed denominal forms.

Each video scene showed a protagonist actively involved in a causal action. The action scenes were nonverbal, except that the protagonist always provided a noun or verb, from which a new word was to be derived. If the scene was designed to elicit a prefixed deverbal causative, e.g. *wy-czyść* (czyścić 'to clean'; wyczyścił 'He cleaned') the protagonist would say two sentences: 1) *Będę czyścić* '(I) will clean,' and 2) *Teraz będę czyścić* 'Now, (I) will clean'. If the scene was designed to elicit a prefixed denominal causative, e.g. *za-kleiła* (kleić 'to glue'; zakleiła '(She) glued-in') the protagonist would say these two sentences: 1) *Gdzie jest klej?* 'Where is some glue?', and 2) *Potrzebuje klej* '(I) need some glue'. In addition to verbal presentation of the noun stem by the protagonist, each of the denominal scenes was preceded by a visual presentation of the
object named by the protagonist. For example, a video picture of glue was shown before the action had begun in the scene which showed gluing of the envelope. Visual and verbal presentations of the objects were used as a means of priming children to produce denominal verbs.

All actions presented in the scenes were intentional and, in addition to that, in all actions designed to elicit denominal verbs, a protagonist acted on an object with an instrument. The semantic role of instrument was always assigned to the object named in the video scene, e.g. the glue, the buttons.

The video tape was prepared by the examiner in Vancouver, BC, on the VHS system and was then translated into Pal/Secam so that it could be viewed in Poland. It consisted of 13 scenes (1 trial and 12 experimental) depicting causal events. Each scene had a clear beginning and an end, and was separated from another one by a 5- to 7- second pause. The overall length of the video tape was 18 minutes.

**Stem categories**

The twelve experimental scenes were grouped into four categories according to the type of the word stem. Four types of word stems were used: 1) an existing verb stem from which an existing prefixed deverbal could be derived; 2) an existing noun stem from which an existing prefixed denominal could be derived; 3) an existing noun stem from which a potential prefixed denominal could be derived; 4) a nonsense noun stem, from which a
novel prefixed denominal could be derived. Each of the four item type categories was represented by 3 video scenes. The categories are further described below. Prior to the presentation of 12 experimental scenes, one trial scene was administered to familiarize the child with the demands of the task. A detailed description of the video scenes can be found in Appendix D.

Category 1: Prefixed deverbal causatives

The first category consisted of those video scenes which were designed to elicit prefixed deverbal causatives already existing and frequently used in the Polish language. The verb stems emphasized in these scenes were: 1) *hamować* 'to stop by braking'; 2) *czyscić* 'to clean'; 3) *piec* 'to bake'.

Category 2: Prefixed denominal causatives

The second category consisted of those video scenes which were designed to elicit prefixed denominal causatives, also existing and frequently used in the Polish language. The noun stems emphasized in these scenes were: 1) *klej* 'glue'; 2) *tapeta* 'wallpaper'; 3) *farba* 'dye'.

Category 3: Potential prefixed denominal causatives

Unlike the first two categories, the third category required the child to produce denominal verbs which currently do not exist in Polish. The video scenes in this item type category depicted real situations, which would be normally described with different causal verbs.
than those that were targeted by the examiner. For these items children were asked to derive novel denominals from labels of familiar objects, creating new words that followed the grammatical derivational patterns. The noun stems emphasized in this category were:
1) guziki 'buttons'; 2) szampon 'shampoo'; 3) stokrotki 'daisies'.

Category 4: Novel prefixed denominal causatives

The fourth category was similar to Category 3 in that the targeted denominals do not exist in Polish. However, the noun stems in these items also were non-existing. Three novel objects were named with novel nouns which served as the bases for derivation. The situations in which the unknown objects appeared showed some resemblance to ones that were well-known to the children. The novel nouns in this category were: 1) krzam (a "special" substance used for filling-in holes in a fence); 2) pszon (a "special" cover used for lining the trunk of a car); 3) nidlo (a "special" substance found on the surface of water).

The novel nouns were constructed under several conditions. They had to be phonetically balanced, phonotactically Polish, made of no more than two syllables, and initiated with a consonant. In addition, they had to have the least number of possible consonant or vowel alternations within the stem. These alternations frequently accompany the conversion of a noun into a verb in Polish. All of these constraints were applied to make the production of new derivatives as easy as possible. Further constraints applied to the derived forms themselves. They had to be phonetically and phonotactically Polish and, after the addition
of the prefix and the verbal suffix (to indicate the change of grammatical class from a noun to verb), had to be made of no more than six syllables.

**Prefix choice**

Three Polish prefixes (described in more detail in the Introduction chapter) were chosen for the experiment: 1) za-, 2) wy-, and, 3) u-. Like other verbal prefixes they convey aspectual information, in this case perfectivity, as well as modify the meaning of the stem.

They were chosen for this study primarily because of their high degree of productivity with denominal verbs and their high frequency of occurrence (Mieczkowska, 1985). The semantic information brought by each of the prefixes in the video scenes can be described as follows:

1) **Prefix za-**: This prefix generally conveys meanings that concern the covering of a usually defective outer surface of an object or the filling-in of an object with an instrument, e.g. *krzam* (a novel noun) is used to fill-in the hole in the fence; or the fastening of an object with an instrument inside of a second object. For example, in the scene with *klej* 'glue', the glue is used to seal a letter in an envelope, and in the scene with *guziki* 'buttons', the buttons are used to enclose a pillow by fastening two sides of a pillow case.

2) **Prefix wy-**: This prefix conveys meanings that concern the covering of an object's surface with an instrument often informing about the result of an action. In the scene with
tapeta 'wallpaper', the wallpaper is put on the wall to decorate the room, and in the scene with the novel object pszon, the pszon is used to line the inside part of the trunk of a car. It also can convey the method of an action (as in the scene with szampon 'shampoo', where the shampoo was used to wash a toy).

3) Prefix u-: This prefix conveys meanings that concern the covering of the surface of an object or a part of an object with an instrument, where in addition, the object being covered acquires a new feature, e.g. becomes prettier or changes colour or quality. In the scene with farba 'dye', the black dye is used to cover a doll's red hair, and as a result of that, the hair changes its colour. In the scene with stokrotki 'daisies', the daisies are used to cover the upper edge of a basket, and as a result of that, the basket is decorated and looks prettier. In the scene with the novel substance nidlo, the nidlo is used to make the shoes dirty.

As was mentioned in the Introduction section, theories on what semantic notions, and what sorts of aspectual information are implied by different prefixes in various lexical combinations (of a prefix and a noun or a verb) are not in concordance. Moreover, there is a high degree of overlap in meaning among various prefixes, which causes many ambiguities in regards to their appropriate choice (Mieczkowska, 1985; Wróbel, 1984). There are some instances where such overlap allows speakers to use different prefixes interchangeably. However, there are also many instances where, despite overlap in meaning, only a specific prefix is allowed. This is often due to the fact that the meaning
of a prefix is further modified by the stem to which it is attached. Sometimes the choice of a specific prefix may be explained by psychological associations between a new event that needs to be described with a new word and a well-known situation described with a well-established word (Chmura-Klekotowa, 1968).

All of the three prefixes chosen for this study convey information about covering an object with another object, or instrument. However, although some of the stems used in the experiment could take the prefix \textit{wy-} as well as the targeted \textit{u-}, a subtle difference in meaning would be easily detected by a native speaker of Polish. For instance, in the example with \textit{farba} 'a dye', a speaker could say \textit{wy-farbować} or \textit{u-farbować} to convey the information that somebody's hair was dyed. While the verb prefixed with the prefix \textit{u-} implies a causal event that was ended with an expected result, the verb with the prefix \textit{wy-} adds extra information, conveying the idea that the one who dyed his hair, dyed it too much and looks rather ridiculous.

These considerations make it difficult to answer the question: What are the correct prefixes for the lexical items chosen for this study? In the absence of \textit{a priori} selection rules, targeted prefixes were determined empirically by obtaining adult data from 19 native speakers of Polish. The video task was administered to adults prior to administering it to the children. The adult subjects watched all of the video scenes, heard the questions, and wrote down their responses. After the session they were asked to review their answers and make changes if they felt that another answer would be better. Once they decided on the
best response, the examiner asked them to analyze each scene and discuss their answer with the examiner, providing arguments for their choice of a prefix. Table 3 shows all video task items with their stem words, targeted prefixes, expected derivations, and glosses.

Table 3. Stem Words, Prefixes and Expected Verbs.

<table>
<thead>
<tr>
<th>Item</th>
<th>Item Cat.</th>
<th>Stem Word</th>
<th>Prefix Type</th>
<th>Expected Verb (Infinitive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 2</td>
<td>perfumy 'perfumes'</td>
<td>wy-</td>
<td>wy-perfum-ować 'to spray perfumes over'</td>
<td></td>
</tr>
<tr>
<td>1. 1</td>
<td>hamować 'to stop'</td>
<td>za-</td>
<td>za-hamow-ać 'to completely stop'</td>
<td></td>
</tr>
<tr>
<td>2. 1</td>
<td>czyscić 'to clean'</td>
<td>wy-</td>
<td>wy-czysć-ić 'to completely clean'</td>
<td></td>
</tr>
<tr>
<td>3. 1</td>
<td>piec 'to bake'</td>
<td>u-</td>
<td>u-piec 'to completely bake'</td>
<td></td>
</tr>
<tr>
<td>4. 2</td>
<td>klej 'glue'</td>
<td>za-</td>
<td>za-kle-ić 'to completely glue in'</td>
<td></td>
</tr>
<tr>
<td>5. 2</td>
<td>tapeta 'wallpaper'</td>
<td>wy-</td>
<td>wy-tapeta-ować 'to completely cover it with wallpaper'</td>
<td></td>
</tr>
<tr>
<td>6. 2</td>
<td>farba 'dye'</td>
<td>u-</td>
<td>u-farb-ować 'to completely dye hair'</td>
<td></td>
</tr>
<tr>
<td>7. 3</td>
<td>guziki 'buttons'</td>
<td>za-</td>
<td>za-guzik-ować/czyć 'to completely close something in with buttons'</td>
<td></td>
</tr>
<tr>
<td>8. 3</td>
<td>szampon 'shampoo'</td>
<td>wy-</td>
<td>wy-szampon-ować/ić 'to clean with shampoo'</td>
<td></td>
</tr>
</tbody>
</table>
This derivational task proved surprisingly difficult even for adults. They resisted producing potential denominals and needed much encouragement to do so. They also tried to convince the examiner that the hypothetical verbs (potential and novel) should not be in the task since they do not exist. Nevertheless, all adult subjects were able to provide prefixed derivatives for all items. All items were prefixed, but 14 errors (total number of responses for 19 adult subject = 228) were noted in regards to prefix choice. The total agreement for all items was 94%. The agreement for the deverbals was 100%, for denominals 98%, for novel denominals 86% and for potential denominals 91%. None of the adult subjects made an error on the item that required the use of the prefix za-. Most of the errors occurred in those contexts where the prefix u- was required (78%). There were only four prefixes used in substitutions: wy- for u- (64% of all substitutions), za- for wy- (21%), o- for u- (7%, 1 instance only) and u- for wy- (1 instance).
Order of presentation

The twelve video scenes were divided into two sets. The first set consisted of the scenes designed to elicit existing lexical causatives, either deverbal or denominal. The second set consisted of those scenes which were designed to elicit hypothetical prefixed denominal causatives derived from existing nouns (potential denominals) and nonexisting nouns (novel denominals). The video scenes belonging to the first set were shown prior to those belonging to the second set. Items within a set were ordered such that the same prefix was not repeated twice in a row. Within these guidelines order of presentation was random. The eventual order was the same for every child (as shown in Table 4).

Table 4. Order of Video Scenes Presentation.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Deverbals and Denominals</th>
<th>Deverbals and Denominals</th>
<th>Item Number</th>
<th>Hypothetical Denominals (Potential and Novel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>zakleić</td>
<td>7.</td>
<td>zakrzamić</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>upiec</td>
<td>8.</td>
<td>wyszamponić</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>wytapetować</td>
<td>9.</td>
<td>unidlić</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>ufarbować</td>
<td>10.</td>
<td>wypszonić</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>wyczysćić</td>
<td>11.</td>
<td>zaguzicyć</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>zahamować</td>
<td>12.</td>
<td>ustokrotczyć</td>
<td></td>
</tr>
</tbody>
</table>
Materials

Prior to the experimental session the experimenter prepared her equipment in the room where testing was to take place. All testing took place in a quiet room, either at the child’s school, preschool or daycare, or at his home. Appointments with the youngest group of children were carefully arranged with their care-givers at times when children were most likely be alert and ready to engage in the tasks.

A TV set with VCR and an audio-recorder were set up before the child came in. The TV was placed away from distractions approximately 2 meters from the child, and the audio-recorder with a built-in microphone was placed on a little table or chair approximately 50-70 centimetres in front of the child.

Procedures

Children were instructed to watch the video scenes carefully and listen for the sentences spoken by the protagonists in each scene. They were told that the experimenter would ask them questions about the scene after they had seen it. The trial example was shown at the beginning of each session to ensure that children understood the task. Then, the experimenter presented the twelve experimental scenes. After the presentation of each scene the video tape was stopped and the examiner asked the experimental question: "What did she/he do?" If a child, upon seeing the initial picture of the targeted object, said that he/she did not know what the object was, he/she was told to watch the scene. If a child asked for repetition of a word (which applied mostly to the novel words) or a sentence
spoken by a protagonist in a video scene, the repetition was provided by the examiner without any other comments or cues. If a child's initial response did not include the targeted form, the examiner provided three types of verbal cues, depending on the type of error made. The error types are described below.

Error type 1: The child does not refer to the targeted action.
Example: for the scene where the protagonist washes a toy with shampoo, the child could say "The toy is dirty". The verbal cues provided in this case would be "Yes, that's right, but what did she do to the toy?" *Co ona zrobila z zabawką?* The examiner emphasized the event, its pastness and its completion.

Error type 2: The child’s response lacks a prefix.
Example: for the scene where the protagonist "wallpapers" the walls in a room, the child’s response might be: *On tapetował* 'He was wallpapering' [Past Continuous Tense, IMPFV] instead of *On wy-tapetował* 'He wallpapered' [Past Tense, PFV]. The verbal cue emphasizing the completion of an action in this example would be "Yes, he was wallpapering the walls, but now he is done. What did he do?"

Error type 3: The child does not provide the targeted prefix.
Example: for the scene where the protagonist dyes her doll’s hair, the targeted response was *Ona u-farbowała lalce włosy* 'She dyed the doll’s hair'. If the child said *Ona za-
farbowala... or Ona wy-farbowala..., the cue provided by the examiner was "Yes, that's good, but can you think of another way of saying that?"

After hearing these verbal cues, the child might still have been unsuccessful. In that case, the examiner would refer the child back to any previous correct response. If none of the previous responses were correct, the examiner referred the child to the one that would be the closest to the one expected. In such cases the examiner would say: "Do you remember that scene when the girl used perfumes? What did you say that she did? Now, how about this one?" If the child was still unsuccessful, the examiner proceeded to the next video item. The same cues applied to all video scenes and no other cues were provided.

If the child had difficulty attending to the video scenes (which was particularly true for the youngest children), the examiner would say "You are doing a good job, try this one now". If this failed, the child was allowed to take a 1-2 minute break, after which his attention was redirected to the task. Questions and comments irrelevant to the task were answered as briefly as possible. If the child asked the examiner about his performance or about what the "correct" answer was, the examiner said: "You are doing a very good job. Every child gives different answers, but I want to hear what you think about these scenes. Try some more".

Subjects participated in one or two sessions, each lasting from 35 to 50 minutes. For the younger subjects the first session was scheduled to administer the preliminary tasks and
the second to administer the experimental task. For the older subjects it was possible to combine the administration of preliminary and experimental tasks in one session. If the subjects met the screening criteria they were given a short break and then were presented the experimental task. The length of a session depended on a child's age. The minimum time period for the preliminary assessment was 15 minutes and for the experimental, 20 minutes.

**Transcription and coding of data**

The audio-tapes from each experimental session were transcribed and the children's responses were evaluated for their level of correctness according to a taxonomy established by the experimenter. The coding categories are summarized below:

- **NR** - No response. The child said nothing or said "I do not know";
- **IR** - Response irrelevant to the task. The child responded with an answer not related to the task;
- **UW** - Unwanted response. The child's response was related to the task, but was not related to the action targeted by the video scene;
- **CUW** - Close Unwanted response. The child's response was related to the targeted action, but the child did not use the stem word presented in the video scene, instead using another word that would also be appropriate for describing such an action;
- **Dn** - Denominal. The child derived a new verb from the noun presented in the video scene;
- **Dv** - Deverbal. The child derived a new verb from the verb presented in the video scene;
Responses that were coded as Dv, Dn, and CUW were also coded for prefixes as follows:

0 - No prefix. The child did not attach any prefix to his CUW, Dn or Dv;
nt - Nontargeted prefix. The child used a prefix different from the targeted one;
t - Targeted prefix. The child used the expected prefix.

The responses coded as Dn-t or Dv-nt were considered as the targeted responses.

The examiner coded all of the children’s responses. However, for closer evaluation, she looked only at the first and the "best" responses. When none of the responses was the targeted response, there was a need to find a method of judging which of the given responses was the best. The judgement was based first on the type of a stem and second on the type of prefix. For instance, if the child’s fourth response was coded as CUW-t (close unwanted stem with a targeted prefix) and the fifth as Dn-0 (denominal verb without a prefix) the fifth response was considered as better because it contained the targeted stem.

If the child’s responses were CUW-nt (close unwanted stem and a nontargeted prefix) and CUW-t (close unwanted stem with a targeted prefix), the prefix was a base for the judgement and the CUW-t was considered as a better response. This evaluation of best responses was important for scoring and coding purposes.

**Interrater Reliability**

Two raters who were native speakers of Polish were trained by the experimenter to help with the reliability measures. The first one listened to audio-recordings taken from experimental sessions of 10 subjects (three from the 3’s and 5’s and two from the 7’s and
9’s) and checked for transcription errors in the children’s responses. A 99.2% agreement was reached on the transcription of the responses. The second rater was trained on coding criteria and independently coded transcripts of 12 children, three children in each age group. Interrater reliability on coding criteria was 97%.
CHAPTER THREE

RESULTS

The purpose of this study was to describe the acquisition of prefixed causative denominal verbs. Two research questions were asked: 1) What is the course of acquisition of prefixed denominal verbs of a causative type?, and 2) What factors account for the productive use of these structures?

In order to discover the child’s productive mastery of these structures, the experimental task aimed at elicitation of grammatical denominals (Dn), potential denominals (PDn) and novel denominals (NDn). The experimental task also included three examples of prefixed deverbals (Dv), which served as a reference point. Twelve short video scenes depicting causal actions were presented to the subjects individually. Each video scene was used as a means of eliciting targeted verbs, three prefixed deverbals and nine prefixed denominals. The base words for derivatives were presented in each scene by one of the characters. Fourty-eight children were grouped into four age groups called respectively: 3’s, 5’s, 7’s and 9’s. Both group and individual performance findings will be presented in this Results chapter.

AGE AND ITEM TYPE DIFFERENCES

The data base consisted of children’s best responses to the experimental task and all results presented in this chapter are based on that information. The correct response was defined
as one which included the use of the appropriate verb or noun stem and the targeted prefix. The number of correct responses that each child made was recorded as a measure of his knowledge of the prefixed verbs.

As a total group, the children answered a mean of 3.4 out of 12 items. They performed best on deverbals (M=2.3; maximum score in each item type category equals 3), followed by denominals (M=.8). The group as a whole performed poorly on novel denominals (M=.2) and on potential denominals (M=.1). Separate scores were obtained for each age group and each item type to more closely investigate differences in performance in regards to these two variables. Table 5 displays the means and standard deviations for correct responses in each item type category for each age group. As can be seen, the overall number of correct responses (maximum = 12) increased with age and ranged from 1.6 to 5.4 across age groups.

The easiest task for the children was to produce a derivative when the stem was originally a verb. Performance on deverbals improved across age groups reaching the ceiling in the oldest group. Denominals were more difficult to produce than deverbals, but even some of the youngest children were able to produce denominals. Production of novel denominals was difficult for all groups. The youngest group was unable to provide any correct example of a targeted verb in this category. Some sign of the emergence of novel denominals can be seen in the groups of 5- and 7-year-olds, however, it is not until the age of nine that any children really are successful in deriving these forms. The poorest
performance was observed on potential denominals. The only group that was able to provide a targeted response was the 9-year-olds (4 targeted responses in the group, maximum score for a group equals 36). None of the children in the younger age groups were able to derive a new denominal verb in this category.

Table 5. Mean (and Standard Deviation) for Number of Correct Responses by Item Type and Age.

<table>
<thead>
<tr>
<th>Item type</th>
<th>Age Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3's</td>
</tr>
<tr>
<td></td>
<td>(\bar{x}) (SD)</td>
</tr>
<tr>
<td>Dv</td>
<td>1.3 (1.1)</td>
</tr>
<tr>
<td>Dn</td>
<td>.3 (.5)</td>
</tr>
<tr>
<td>NDn</td>
<td>- -</td>
</tr>
<tr>
<td>PDn</td>
<td>- -</td>
</tr>
<tr>
<td>Total</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Maximum score in each item type category is 3.

To investigate the reliability of the differences evident in Table 5, scores were subjected to a two-way, repeated measures analysis of variance (ANOVA), Age (4) x Item Type (4), with number of correct responses in each item type category as the dependent variable. Age group (3's, 5's, 7's, 9's) acted as a between subject variable, and item type (Dv, Dn, NDn, PDn) acted as a within subject variable. Analysis revealed a significant main effect for Age, \(F=20.30; \text{df}=3,44; p<0.01\), and for Item Type, \(F=208.76; \text{df}=3,132;\)
p < 0.01. A significant Age x Item Type interaction was also observed, F = 5.65; df = 9, 132; p < 0.01.

Post-hoc analysis (Scheffe tests) indicated that overall performance significantly improved at each stage interval with the youngest children performing worst and the oldest children performing best. Performance on the deverbal forms was reliably superior to performance on the denominal items, and performance on denominals was reliably superior to performance on either the novel or the potential denominals. Performance on the latter two items did not reliably differ. The interaction effect resulted from the fact that different item types showed differing amount of improvement with age.

SEQUENCE OF ACQUISITION

In order to observe whether or not the targeted structures were learned in a consistent and definable sequence, a subject-wise analysis was performed in two steps. The first step aimed at describing the quality and quantity of individual children's responses. Table 6 shows the response patterns for individual children and reveals a strong relationship between the overall number of correct responses and the nature of the responses. These subject-wise data confirm the trends seen in the grouped data and provide strong evidence that children acquire prefixed denominals in a predictable order. If they provide any correct responses, there is always at least one deverbal. Once they produce at least one deverbal they may attempt to produce a denominal, but usually the denominals occur only if the child has given two or more deverbals. Success on novel denominals comes only if
Table 6. Observed Response Pattern and Mean Age of Children Evidencing Different Patterns.

<table>
<thead>
<tr>
<th>Number of Responses</th>
<th>Observed Combination of Responses</th>
<th>Number of Ss</th>
<th>Mean Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>a. none</td>
<td>4</td>
<td>2;10</td>
</tr>
<tr>
<td>1</td>
<td>a. 1 Dv</td>
<td>4</td>
<td>4;3</td>
</tr>
<tr>
<td>2</td>
<td>a. 1 Dv+ 1 Dn</td>
<td>2</td>
<td>5;6</td>
</tr>
<tr>
<td></td>
<td>b. 2 Dv</td>
<td>6</td>
<td>4;11</td>
</tr>
<tr>
<td>3</td>
<td>a. 3 Dv</td>
<td>5</td>
<td>6;3</td>
</tr>
<tr>
<td></td>
<td>b. 2 Dv+ 1 Dn</td>
<td>3</td>
<td>5;3</td>
</tr>
<tr>
<td>4</td>
<td>a. 3 DV+ 1 Dn</td>
<td>14</td>
<td>8;7</td>
</tr>
<tr>
<td>5</td>
<td>a. 3 Dv+ 2 Dn</td>
<td>3</td>
<td>9;10</td>
</tr>
<tr>
<td>6</td>
<td>a. 3 Dv + 3 Dn</td>
<td>1</td>
<td>8;6</td>
</tr>
<tr>
<td></td>
<td>b. 3 Dv + 2 Dn + 1 NDn</td>
<td>2</td>
<td>6;11</td>
</tr>
<tr>
<td></td>
<td>c. 3 Dv + 1 Dn + 2 NDn</td>
<td>1</td>
<td>10;6</td>
</tr>
<tr>
<td></td>
<td>d. 3 Dv + 1 Dn + 1 NDn + 1 PDn</td>
<td>1</td>
<td>10;6</td>
</tr>
<tr>
<td>7</td>
<td>a. 3 Dv + 1 Dn + 2 NDn + 1 PDn</td>
<td>1</td>
<td>8;9</td>
</tr>
<tr>
<td>9</td>
<td>a. 3 Dv + 2 Dn + 2 Ndn + 2 PDn</td>
<td>1</td>
<td>9;0</td>
</tr>
</tbody>
</table>

the child has given all correct answers in the deverbal category and at least one correct response in the denominal category. Success on potential denominals comes only if the child is able to give at least one correct answer in the novel category, however a correct
answer in the novel denominals does not immediately indicate that he is going to be successful in the potential denominals. It was never observed that the child would produce a potential denominal without producing a novel denominal. The pattern of acquisition seen in Table 6 was not contradicted by any subject.

Second step of the subject-wise analysis was performed to determine the number and age of children who met one of the following performance level criteria:

Level A: no or one response, always one response in deverbals;
Level B: two or three responses, all in the deverbal category;
Level C: three or four responses, always two or three in deverbals, and if any other was present, it was always in the denominals (Dn);
Level D: at least five responses, all correct in deverbals; there must be two correct in any other denominal category;
Level E: nine responses, all correct in deverbals, and in addition, there are two correct responses in each denominal category.

The second part of the analysis aimed at examining the association between age and performance level. It showed that, while mean age for each performance level increases, there is a large individual variability in regard to timing of acquisition. For example, some children as old as 6;8 may not be able to perform above the A level, while their peers would at the same time perform at the D level. Since the number of subjects who passed the A, B and C levels is large (39 subjects between age 2;8 and 10;6), this analysis
represents a generally low performance level across children. Table 7 shows the results of the performance level analysis.

Table 7. Performance Level of Individual Children.

<table>
<thead>
<tr>
<th>Level</th>
<th>Number of Children</th>
<th>Mean Age</th>
<th>Minimum Age</th>
<th>Maximum Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>3;10</td>
<td>2;8</td>
<td>6;8</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
<td>5;6</td>
<td>3;9</td>
<td>7;7</td>
</tr>
<tr>
<td>C</td>
<td>18</td>
<td>7;6</td>
<td>3;11</td>
<td>10;6</td>
</tr>
<tr>
<td>D</td>
<td>8</td>
<td>8;9</td>
<td>5;10</td>
<td>10;6</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>9;0</td>
<td>9;0</td>
<td>9;0</td>
</tr>
</tbody>
</table>

The wide range of response patterns within age groups, described by different performance levels, as well as a small number of subjects who passed level C, make it impossible to make strong generalizations about the sequence of acquisition of novel and potential denominals. Based on these data it would appear that novel denominals are easier to produce than potential denominals and are more likely to be produced earlier than the potentials. There were only three subjects who gave at least one correct response in both categories, the novel and potential denominals. None of the subjects produced a potential denominal without producing a novel denominal first.
Overall, the subject-wise data revealed two important things. First, that children acquire denominals in a predictable order. The acquisition of deverbals seems to be a prerequisite for acquisition of denominals. When acquiring denominals children proceed from production of existing denominals, to novel denominals and then, to potential denominals. No instance of any other sequence of acquisition was observed. Second, there is a large individual variation in regards to the timing of acquisition. Interestingly, children aged 2;8-10;6 can be found performing at any of these three levels: A, B or C. In spite of such variability, none of the subjects younger than 5;10 performed at level D, and only one subject, aged 9;0 performed at level E. Due to such large variability, it seems that the age of acquisition of prefixed denominals is not as predictable as the sequence of their acquisition.

SCHOOL ACHIEVEMENT AND ON-TASK PERFORMANCE

Since standardized achievement test scores were unavailable, as a rough estimation of children’s school achievement, I asked teachers and, where appropriate, parents, to indicate which child was a high or an average achiever in terms of overall school performance. The reason for excluding low achievers from the study was based on the assumption that their low achievement could have been attributed to linguistic factors and would need further investigation. Since this study aimed at examining the development of linguistic forms in children who did not present any apparent language difficulties, it was decided that only average and high achievers should participate in the experiment. Four high achievers and 8 average achievers were found in each age group.
To investigate the relationship between school achievement and task performance, children were designated as having task scores that were above or below the mean for their age group. The resulting correspondences between school achievement and task performance is given in Table 8.

### Table 8. Number of High and Average Achievers Performing Below and Above the Mean for Their Age Group.

<table>
<thead>
<tr>
<th>Achievement Level</th>
<th>Below Mean</th>
<th>Above Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Achievement</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Average Achievement</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

A difference in performance between high and average achievers was found. In the group of high achievers, 69% performed above the mean for their age group. In the group of average achievers, 50% (16 subjects) performed below, and 50% (16) above, the mean for their age group. A chi-square test of these distributions indicated that school achievement was reliably associated with better task performance ($\chi^2 = 1.5$, df=1, p < .05).

**GENERAL ERROR ANALYSIS**

Having established the performance level and sequence of acquisition for the types of denominal verbs tested in this study, I then attempted to explore the nature of the acquisition process. As a first step, I conducted an analysis of the errors made by children in each group. To make an error, a child could do one or more of the following (see
coding in Chapter 1):

1) give no response (NR);

2) give an irrelevant response (IR); e.g. in the scene where a girl puts daisies around the basket the targeted response is *u-stokrotkowala*. An irrelevant response might be "I have shoes";

3) focus on a nontargeted event or detail unrelated to the causal action (UW, unwanted); e.g. in the scene described above an unwanted response might be "She saw daisies";

4) provide a nontarget word to describe the targeted causal event, but one that is reasonable for that event (CUW); e.g. in the same scene a close response might be "She decorated her basket with daisies";

5) provide a nontarget prefix (-nt); e.g. *po-piekl* when the targeted response is *u-piekt*;

6) provide no prefix (-0); e.g. *piekl* instead of *u-piekt*.

Error categories 1-4 were mutually exclusive, as were categories 5-6. However, the prefix codes 5-6 could co-occur with stem codes 3-4. Responses coded as close unwanted were further divided into those with verbal stems and those with nominal stems. Since the previous findings showed differences in performance associated with age and item types, the error analysis was made in regard to these variables. Tables 9, 10, 11 and 12 show proportions of erroneous responses in each item type category by age. In each table, the error types that are furthest from the correct response, i.e. those involving erroneous items, are listed near the top. Errors involving only the prefix are listed toward the bottom. Each vertical column provides an error distribution for a given age group or for
the groups combined. Responses that do not relate to the targeted causal events, i.e. these coded as no response, irrelevant or unwanted, are not tabulated, though they are included in the calculations. These unrelated responses (N=79) were primarily (74) provided by the 3- and 5-year-olds on the more difficult item types (38 on novel denominals, 24 on potential denominals). At the bottom of each table, the error rate for each age group on the respective item type is provided as a point of reference. For example, Table 9 indicates that the 3-year-olds made errors on 58.3% of the deverbal items, and that 33.3% of these errors consisted of the omission of a prefix on the targeted stem (Dv-0).

Since no errors were seen in the oldest group and a small percentage of errors in the 7-year-old group, the error pattern seen in the deverbal category, Dv, represents mainly the performance observed in the 3’s and 5’s (Table 9). In spite of differences in the error rate between these two groups, the most frequent error type for both was the use of a correct stem without a prefix. Use of nontargeted stems was seen in the 3’s but rarely in the 5’s. Likewise, the 3’s but rarely the 5’s used the correct stem with a nontargeted prefix. No child tried to use a verb derived from a nominal stem.
Table 9. Overall Error Rate and Proportion of Errors in Deverbals by Age.

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Age Group</th>
<th>3's</th>
<th>5's</th>
<th>7's</th>
<th>9's</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (#)</td>
<td>% (#)</td>
<td>% (#)</td>
<td>% (#)</td>
<td>% (#)</td>
<td></td>
</tr>
<tr>
<td>Verbal CUW-t</td>
<td>19.0 (4)</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>17.2 (5)</td>
</tr>
<tr>
<td>Verbal CUW-nt</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>Verbal CUW-0</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>Nominal CUW-t</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>Nominal CUW-nt</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>Nominal CUW-0</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td></td>
</tr>
<tr>
<td>Dv-nt</td>
<td>23.8 (5)</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>20.7 (6)</td>
</tr>
<tr>
<td>Dv-0</td>
<td>33.3 (7)</td>
<td>77.8 (7)</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>51.7 (15)</td>
</tr>
<tr>
<td>OTHER</td>
<td>19.0 (4)</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>17.2 (5)</td>
</tr>
<tr>
<td>Error rate</td>
<td>58.3 (21)</td>
<td>25.0 (9)</td>
<td>5.5 (2)</td>
<td>- -</td>
<td>- -</td>
<td>22.2 (32)</td>
</tr>
</tbody>
</table>

* One instance

When children did not provide the correct answers in the existing denominals, Dn, (Table 10), they either provided a nontargeted denominal verb (15% of total responses), or nontargeted deverbal form (27.1%), or the targeted denominal stem with a nontarget prefix (44.9%). Unlike the error pattern for deverbals, there were no instances of the correct stem without a prefix. Also unlike the deverbals, children used both verbal and nominal stems in their lexical substitutions. Age differences in error patterns are seen primarily in
the 9-year-old group. Unlike younger children, the 9-year-olds almost always provided a nominal stem, usually the correct one, albeit a nontargeted prefix.

Table 10. Overall Error Rate and Proportion of Errors in Denominals by Age.

<table>
<thead>
<tr>
<th>Error Type</th>
<th>3’s</th>
<th>5’s</th>
<th>7’s</th>
<th>9’s</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>(#)</td>
<td>%</td>
<td>(#)</td>
<td>%</td>
</tr>
<tr>
<td>Verbal CUW-t</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Verbal CUW-nt</td>
<td>36.4 (12)</td>
<td>22.6 (7)</td>
<td>32.0 (8)</td>
<td>-</td>
<td>27.1 (29)</td>
</tr>
<tr>
<td>Verbal CUW-0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nominal CUW-t</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nominal CUW-nt</td>
<td>11.1 (4)</td>
<td>15.2 (5)</td>
<td>11.1 (4)</td>
<td>16.6 (3)</td>
<td>15.0 (16)</td>
</tr>
<tr>
<td>Nominal CUW-0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dn-nt</td>
<td>25.0 (9)</td>
<td>45.2 (14)</td>
<td>33.3 (12)</td>
<td>72.2 (13)</td>
<td>44.9 (48)</td>
</tr>
<tr>
<td>Dn-0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OTHER</td>
<td>22.2 (8)</td>
<td>9.7 (3)</td>
<td>-</td>
<td>-</td>
<td>10.3 (11)</td>
</tr>
<tr>
<td>Error rate</td>
<td>91.7 (33)</td>
<td>86.1 (31)</td>
<td>69.4 (25)</td>
<td>50.0 (18)</td>
<td>74.3 (107)</td>
</tr>
</tbody>
</table>

* One instance only
When children did not provide the correct answers in the novel denominals, NDn, (Table 11), they usually provided a nontargeted verbal stem with a nontargeted prefix (33.6%), or Other response (28.4%), or a nontargeted verbal stem with a targeted prefix (24.6%). The Other responses represent for the most part the groups of the 3’s and the 5’s. Unlike in the Dn, the use of the nontargeted verbal stem with a targeted prefix increased and was observed for the most part in the 7’s and 9’s. A small number of children (7.5%) used a

Table 11. Overall Error Rate and Proportion of Errors in Novel Denominals by Age.

<table>
<thead>
<tr>
<th>Error Type</th>
<th>3’s % (#)</th>
<th>5’s % (#)</th>
<th>7’s % (#)</th>
<th>9’s % (#)</th>
<th>Combined % (#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal CUW-t</td>
<td>5.6 (2)</td>
<td>8.6 (3)</td>
<td>42.9 (15)</td>
<td>44.8 (13)</td>
<td>24.6 (33)</td>
</tr>
<tr>
<td>Verbal CUW-nt</td>
<td>27.8 (10)</td>
<td>40.0 (14)</td>
<td>31.1 (13)</td>
<td>31.0 (9)</td>
<td>33.6 (45)</td>
</tr>
<tr>
<td>Verbal CUW-0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nominal CUW-t</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nominal CUW-nt</td>
<td>8.3 (3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.7 (5)</td>
</tr>
<tr>
<td>Nominal CUW-0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NDn-nt</td>
<td>-</td>
<td>5.7 (2)</td>
<td>5.7 (2)</td>
<td>20.7 (6)</td>
<td>7.5 (10)</td>
</tr>
<tr>
<td>NDn-0</td>
<td>-</td>
<td>-</td>
<td>5.7 (2)</td>
<td>-</td>
<td>2.2 (3)</td>
</tr>
<tr>
<td>OTHER</td>
<td>55.5 (20)</td>
<td>42.9 (15)</td>
<td>5.7 (2)</td>
<td>-</td>
<td>28.4 (38)</td>
</tr>
</tbody>
</table>

* One instance only
targeted nominal stem with a nontargeted prefix, and the majority of them were in the 9’s. There were only three instances (2.2%) of not using a prefix at all, all for the converted denominals.

The results presented in Table 12 suggest that there was a clear improvement in the use of targeted prefixes (with nontargeted stems, however) between the younger groups (3’s and 5’s) and the older groups (7’s and 9’s) in the category of potential denominals, PDn. The use of a nontargeted prefix (with a nontargeted stem) was still the second common error, however the number of nontargeted prefixes represents mainly the 3’s, 5’s and 7’s. Unlike in novel denominals, no instance of a nontargeted nominal stem was observed. Alike in the novels, the responses coded as Other represent for the most part (with an exception of one case) the performance of the 3’s and the 5’s. The use of a correct stem with a nontargeted prefix was the least frequent error type (5.7%) and was seen only in the 9’s. No child provided an unprefixed potential denominal.
Table 12. Overall Error Rate and Proportion of Errors in Potential Denominals by Age.

<table>
<thead>
<tr>
<th>Error Type</th>
<th>3’s</th>
<th>5’s</th>
<th>7’s</th>
<th>9’s</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>(#)</td>
<td>(#)</td>
<td>(#)</td>
<td>(#)</td>
<td>(#)</td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUW-t</td>
<td>27.8</td>
<td>27.8</td>
<td>58.3</td>
<td>59.4</td>
<td>41.7</td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUW-nt</td>
<td>25.0</td>
<td>55.6</td>
<td>41.7</td>
<td>12.5</td>
<td>34.3</td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUW-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUW-t</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUW-nt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUW-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDn-nt</td>
<td></td>
<td></td>
<td></td>
<td>25.0</td>
<td>5.7</td>
</tr>
<tr>
<td>PDn-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td>47.2</td>
<td>16.7</td>
<td></td>
<td></td>
<td>17.1</td>
</tr>
<tr>
<td>Error rate</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>88.9</td>
<td>97.3</td>
</tr>
</tbody>
</table>

* One instance only

Summarizing the evidence across item types, the following conclusions seem justified. First, there is clear evidence of increasing ability to handle the experimental task. The older children were more likely to talk about the targeted event and more likely to use the targeted stem. Second, children of all ages seemed to appreciate the need to use a verbal prefix. Only 20 out of 498 descriptions of the targeted event failed to include a prefix. Interestingly, most of these prefix omissions occurred with the deverbal items in the
younger age groups. Third, children of all ages gave evidence that the "double derivation" implicit in creating a prefixed denominal verb was more difficult than the "single" derivation implicit in forming a deverbal. Fourth, evidence of independent knowledge of prefix meaning can be seen in the older groups. For both novel and potential denominals, the 7- and 9-year-olds provided a substantial number of responses that had the targeted prefix with a nontargeted stem. Finally, there is the suggestion that control of the prefix preceds control of denominalization. Seven-year-olds give evidence for knowing prefix meanings, but only the 9-year-olds provide high rates for denominal stems with nontargeted prefixes. This is, again, particulary clear on the novel and potential items.

PREFIX ERRORS

Additional information on the acquisition of prefixed denominals, as well as about the factors that might determine their use, was gathered through the analysis of prefix use. This involved determining the overall number of targeted prefixes in obligatory contexts with either targeted or nontargeted stems, as well as the interaction between the use of a targeted prefix and the item type category. Also, a prefix substitution analysis was done to determine type and frequency of occurrence for prefixes substituting for za-, wy-, and u-. In those instances where the results for the whole group (N=48) are representative for each age group, the data for individual age groups will not be reported.
Each of the three tested prefixes should have occurred in 192 obligatory contexts. Prefix 
za- occurred in 62.5% of its obligatory contexts (with either targeted or nontargeted stem), 
prefix wy- in 39.6%, and prefix u- in 35.9%. A similar pattern of frequency of use for 
each of the tested prefixes was observed within each of the age groups, with prefix za-
used more often than the two other prefixes. Although there was a developmental trend, 
characterized by increasing number of prefixes with age, a major improvement of 
performance occurred in the 7's. The 7's doubled the use of the prefix za- and the prefix 
u- in comparison to the 5's. The 9's performed similarly to the 7's on za- and u-; 
however, they improved in use of the prefix wy- in comparison to all younger groups. 
Table 13 presents the results of this analysis.

Table 13. Overall Number of Occurrences of za-, wy-, u- in Obligatory Contexts by Age 
Group.

<table>
<thead>
<tr>
<th>Prefix</th>
<th>3's</th>
<th>5's</th>
<th>7's</th>
<th>9’s</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>za-</td>
<td>16</td>
<td>22</td>
<td>40</td>
<td>42</td>
<td>120</td>
</tr>
<tr>
<td>wy-</td>
<td>9</td>
<td>16</td>
<td>20</td>
<td>31</td>
<td>76</td>
</tr>
<tr>
<td>u-</td>
<td>10</td>
<td>11</td>
<td>24</td>
<td>24</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>49</td>
<td>84</td>
<td>97</td>
<td>265</td>
</tr>
</tbody>
</table>
The next step in the prefix analysis was to see whether or not item type category influenced the occurrence of a targeted prefix. Preliminary data showed that there was a large discrepancy between the use of a targeted prefix between the deverbals and all types of denominals, so it was decided to combine the denominals and compare them with the deverbals as a group. The ratio between the use of targeted prefixes for denominals and deverbals was 3.56 for the 3’s, 4.0 for the 5’s, 2.04 for the 7’s, and 1.77 for the 9’s. The ratio of performance on denominals and deverbals for the group was 2.37. The larger number for the 5’s reflects the fact that the use of a targeted prefix in deverbals for the 5’s increased in comparison to the 3’s, relatively more than the use of a targeted prefix in denominals. The lower ratio observed in the 7’s indicates that they used relatively more targeted prefixes with the denominals than the younger groups. The proportion of targeted prefixes for deverbals and denominals observed in the 7’s remained almost the same for the 9’s.

Overall, this analysis revealed that deverbal derivatives are not only easier to produce, but also that the deverbal items were more likely to be elicited with a targeted prefix (Table 14). Data also suggests that there is a possibility that before children are able to prefix denominals they may need to know how to produce prefixed deverbals (this is particulary suggested by the "big jump" in performance between the 5’s and the 7’s).
Table 14. Frequency of Targeted Prefixes in Deverbal and Denominal Items by Age Group.

<table>
<thead>
<tr>
<th>Item Type</th>
<th>3's</th>
<th>5's</th>
<th>7's</th>
<th>9's</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV x 3 *</td>
<td>57</td>
<td>84</td>
<td>102</td>
<td>108</td>
<td>351</td>
</tr>
<tr>
<td>Dn+PDn+</td>
<td>16</td>
<td>21</td>
<td>50</td>
<td>61</td>
<td>148</td>
</tr>
<tr>
<td>NDn</td>
<td>16</td>
<td>21</td>
<td>50</td>
<td>61</td>
<td>148</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>105</td>
<td>62</td>
<td>169</td>
<td>499</td>
</tr>
</tbody>
</table>

* Frequencies have been trebled to control for differing number of contexts. Maximum possible denominal or deverbal for each age = 108.

The last step in the prefix analysis was to determine the type and frequency of occurrence of prefixes substituting for targeted prefixes. Data for all age groups were combined and are displayed in Table 15. Substitutions at frequencies lower than 5 are indicated by an dashes (- -). The analysis shows that prefix za-, which was most likely to be used appropriately among the three prefixes, was "replaced" in 39 items; the most frequent choices were: po- (28.2% of all substitutions), s/z/ze- (25.6%), przy- (20.5%) and w- (12.8%). Prefixes wy- and u- were replaced in almost the same number of items, 89 and 85 respectively. Prefix wy- was replaced by the prefixes: u- (25.8%), po- (20.2%), w- (14.6%), and za-, and, przy- (11.2% each). Prefix u- was replaced by: po- (41.2%), wy- (25.9%), za- (11.8%) and o-/ob- (10.6%).
Three interesting patterns emerge from these data. First, \textit{po-} is the most generally used "substitute" prefix, occurring in 30.0% of error responses and replacing all three targets. Second, for each prefix there are 2-3 favored substitutes, accounting for half to three quarters of the error responses. Third, with the exception of \textit{po-}, these favored substitutes are different for each prefix. For the prefix \textit{za-} there are \textit{przy-} (20.5%) and \textit{s-/z-/ze-} (25.6%); for the prefix \textit{wy-} there is \textit{u-} (25.8%); and for the prefix \textit{u-} there is \textit{wy-} (25.9%).

15. Proportional Distribution of Prefixes Substituted for \textit{za-}, \textit{wy-} and \textit{u-}.

<table>
<thead>
<tr>
<th>Pfx</th>
<th>\textit{za-}</th>
<th>\textit{wy-}</th>
<th>\textit{u-}</th>
<th>\textit{po-}</th>
<th>\textit{przy-}</th>
<th>\textit{w-}</th>
<th>\textit{s-/z-/ze-}</th>
<th>\textit{o-/ob-}</th>
<th>\textit{na-}</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{za-}</td>
<td>28.2</td>
<td>20.5</td>
<td>12.8</td>
<td>25.6</td>
<td>--</td>
<td>--</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{wy-}</td>
<td>11.2</td>
<td>25.8</td>
<td>20.2</td>
<td>11.2</td>
<td>14.6</td>
<td>--</td>
<td>5.6</td>
<td>6.7</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>\textit{u-}</td>
<td>11.8</td>
<td>25.9</td>
<td>41.2</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(--) Dashes indicate less than 5 occurrences of a prefix.

SUMMARY OF FINDINGS

The major findings of this study can be summarized as follows:

1) There is an association between performance level and item type, with deverbals being the easiest and potential denominals being the most difficult category;

2) There is an association between performance level and age. The only subjects who show much success in deriving a prefixed novel denominal are the 9-year-olds;

3) There is an association between performance level and school achievement. High
achievers are twice as likely as average achievers to perform above the mean for their age group;

4) Children acquire prefixed denominals in a predictable order. They have to know how to produce prefixed deverbals before they produce prefixed denominals. Once they know how to produce prefixed deverbals, they produce unprefixed denominals. Before they produce targeted denominals, they go through a stage of using a nontargeted prefix with a targeted denominal form;

5) There is a large individual variability in timing of acquisition of prefixed denominals;

6) There is an association between prefix use and item type category. Prefixes are more frequently used with deverbals than with denominals;

7) Prefixation is a widely used derivational process; however, many prefixes used by children are not the ones that would be used by adult speakers of Polish;

8) Some prefixes are more likely than others to substitute for the targeted ones.
The present study was designed to explore productive use of prefixed denominal causatives by preschool and early school age children whose native language is Polish. Production of these forms was examined through experimentation. Two research questions were asked: 1) What is the course of acquisition of prefixed denominal causatives?, and 2) What factors account for the productive use of these structures? Based on relevant research literature, the process of acquisition of prefixed denominal causatives was predicted to be lengthy and continuing into the school years; however not all processes involved in production of these structures were predicted to be equally demanding.

The most significant results of this study refer to the age and order of acquisition of prefixed denominal causatives. The results show that despite large individual variability, younger children perform significantly worse than older children. The mean scores representing number of correct responses on the experimental task for each group were: 1.6 for the 3’s, 2.8 for the 5’s, 3.8 for the 7’s and 5.4 for the 9’s. An association between performance level and item type was also found, with deverbals being the easiest and potential denominals being the most difficult category. Age was found to be a good predictor of performance on novel denominals; the only group who showed some success on this item type were the 9-year-olds.
The order of acquisition of prefixed denominal causatives, based on this study, can be described in the following way:

Stage One: Production of an unprefixed well-known verb;

Stage Two: Production of a well-known verb with either a targeted or nontargeted prefix (with more nontargeted prefixes);

Stage Three: Increase of production of targeted prefixes with either targeted or nontargeted stem;

Stage Four: Conversion of a noun into a verb; no prefix;

Stage Five: Production of a prefixed denominal; prefix errors lower in comparison with the prefix errors at Stage Two;

Stage Six: Fully productive prefixed denominals.

As was observed, none of the children seemed to contradict the above pattern. In addition to this, I observed that it was not until age 9 that children were able to fully control production of prefixed denominal causatives. This can be considered as late and contradictory to findings from Chmura-Klekotowa (1967, 1968). She provides evidence for productive use of innovative prefixed denominal causatives by children younger than 3 years. If such young children had indeed mastered the rule enabling them to produce prefixed denominal causatives, I would assume that all of my subjects (N=48) should have performed better on the experimental task. In this chapter I will provide an explanation for possible sources of the discrepancy found between Chmura-Klekotowa’s and this study in regard to age of acquisition of prefixed denominal causatives.
Based on the language acquisition literature, I will consider the following factors as possible sources of difficulty: a) linguistic expression of causality, b) phonological and phonotactic skills, c) linguistic processes required, i.e. suffixation and prefixation, and, d) metalinguistic knowledge.

LINGUISTIC EXPRESSION OF CAUSALITY

Given the work of Ammon (1981), Bowerman (1974, 1977, 1982) and others (Bronckart & Sinclair, 1973, Gentner, 1978), children younger than 3 can already talk about causal situations if such situations are not complicated, e.g. if they do not refer to psychological causation, and do not require explanation of causality. The easiest causal relation understood and described by young children is when a causal situation exists directly between an agent and the resulting event. According to Bowerman (1974) children express causality in verbs and verb phrases by 2;6 by using general verbs such as "make", "put", and "get". English-speaking children older than 3;6 use both periphrastic and lexical causative expressions to describe causal actions. Due individual variations in language acquisition, it can be presumed that the linguistic means for expressing causality used by children of the same age differ in terms of linguistic complexity.

Since expression of causality is easier than explanation of causality, the presentation of my experiment had to be organized in such a way that the youngest children would be able to perceive events as causal. Thus, to help them with the task, only one causal action was
presented in each video scene, and the causality was purely mechanical. In addition to that, the children were asked to describe a causal event without providing an explanation for it.

The data from this study ultimately indicate that expression of causality was not, in itself, the deficient aspect of the experimental task. The coding system for transcripts was such that any time a child did not refer to a causal event presented in a scene but talked about other aspects of that scene, for instance instead of saying "She glued in the envelope" would say "She had an envelope", the examiner coded the response as UW (unwanted word). Anytime a child did not provide a response, or gave an irrelevant response, the examiner coded his response as NR (no response) or IR (irrelevant). In the final analyses, these three categories were combined into the Other category. If children had difficulty with expressing causality, such difficulty might have been reflected in the number of Other responses.

At first glance, the results seem to suggest that expression of causality may have been a problem at least for the younger children. The percentage of Other responses varied with age and item type. In the category of denominals, the Other responses constituted 7.6% of all responses, all found in the 3's (73% of 7.6%) and 5's. In the category of novel denominals, the Other responses constituted 26.4% of total responses, of which 92% were found in the 3's (53% of 92%) and 5's. In the category of potential denominals 17% of Other responses were found, all but one found in the 3's and 5's. There is, however, one important finding that calls this line of argument into question. If children had difficulty
with describing causal actions, they would have also provided the Other responses in deverbals. There were only 5 of these responses seen in this category (3.4% of total use), all but one found in the 3's. In short, these numbers suggest that the 7's and the 9's do not experience difficulty with expressing causal actions, and also call into question any claim that the younger children lacked the ability to express causal relations. If the 3's and 5's had had difficulty with expressing causality, then they would have probably failed to describe not only the different types of denominal scenes, but also the deverbal ones.

To conclude, this study did not show that expression of causality is a major factor impairing children’s performance. Contrary to that claim, the opposite seems to be true. Children as young as 2;8 (the age of the youngest child in the study) proved able to convey causal meanings with the use of linguistic means, albeit not always the ones chosen by the adult speakers of Polish. Overlooking errors in prefixation and stem selection, some 88% of the children's verb responses already referred to a causal event. Upon reflection, it seems likely that the greater number of Other responses found in the 3’s and the 5’s (but for the most part in the 3’s) were due to factors such as: short attention span, greater distractibility, lack of understanding of the demands of the task, and vocabulary gaps (for example, some children used the word *malować* 'to paint' to describe any action which referred to covering a surface of an object with another material).
Overall, these analyses indicate that if children failed to produce prefixed denominal causatives, the source of difficulty was most likely to be related to other factors than to the linguistic expression of causality.

**PHONOLOGICAL AND PHONOTACTIC SKILLS**

Another possible explanation for performance failure might be related to the phonological and phonotactic demands of the task. To make sure that the subjects were phonologically and phonotactically ready to participate in this study, the examiner administered a screening task. During the screening of children's phonological and phonotactic skills, the examiner paid attention to the type of errors made on the imitation task, picture naming task, as well as to the errors made in language samples. Children who had difficulty with phonology and phonotactics, whose speech was not intelligible enough, were excluded from the study. There was another group of children who presented some segmental phonological errors that were considered as developmental, for example, when fricatives substituted affricates in the 3-year-olds. Such errors did not exclude children from further participation in the experiment.

The imitation task served as a good tool for examining children's phonotactic skills. In this task children were provided with a model pronunciation for a set of words which they had to repeat after the examiner. Sixteen words of increasing number of syllables (the shortest word was a 2-syllable word *ku-piec*, and one of the longest was a 5-syllable word *au-toma-ty/cz-ny*) were administered to children for imitation. The items were matched
phonotactically with the verbs targeted in the experimental task. The nominal stems used in the experimental task consisted of one, two, or three syllables, but after the suffixation and prefixation of the stem, the derivatives consisted of two (one instance only) to six syllables. The experimental task was phonologically demanding, especially due to the number of consonant clusters present in the targeted verbs (e.g. three consonant clusters were found in the verb *ustokrotkowala*).

Even though I attempted to eliminate phonological factors in this study by prescreening, there was a possibility that some of the subjects who passed the screening task, might have been unable to produce 6-syllable words in spontaneous speech, and thus failed the task because of its phonotactic demands. However, this explanation for the failure would only apply to the 3’s and the 5’s. The 7’s and the 9’s were observed to have a rather sophisticated repertoire of words in their vocabularies and made no phonological errors on the imitation task. However, despite their errorless production of words on the imitation task, many of them failed to do well on the video task.

It seems then, that, although phonological and phonotactic skills might have influenced children’s performance by being a necessary prerequisite for production of prefixed denominal causatives, they failed to be sufficient to guarantee a successful performance on these structures. This leads us to look further for factors that made the experimental task difficult, even for older children.
The present study suggests that it is not until age 9 that children are able to derive a prefixed causal verb from a given nominal stem. Thus far I have discussed, and largely dismissed, semantic (causal) and phonological (and phonotactic) sources of difficulty. Other possible factors contributing to such late acquisition of prefixed denominal causatives relate to the linguistic processes required for their production.

Morphological analysis of the targeted structures indicates that two major linguistic operations had to be performed: 1) conversion of a noun into a verb, through suffixation, and, 2) attachment of a prefix to a newly derived verb. I will argue that the results of the experiment show that children's difficulty with production of prefixed denominals seems to be more attributable to suffixation than prefixation, which suggests that these two derivational processes are not equally demanding. I will argue further that the difficulty in using these suffixes and prefixes is related to functions they serve. The primary function of the suffix is, as was mentioned earlier, to change the grammatical class of a word (a noun becomes a verb). The primary function of the prefix is, in contrast, to expand the meaning of the verb by adding elements that refer to, for example location or manner, and by conveying perfectivity.

**Suffixation**

Children in this experiment converted only 26.6% of the model nouns into verbs. This performance on the denominals, requiring suffixation, was significantly poorer than
performance on the deverbals, requiring only prefixation. Items of the latter type were passed at a rate of 81.9%. Although the difficulty of the denominals was especially pronounced in the hypothetical items (NDn and PDn), even the existing denominal items (Dn), were passed at lower rates than the deverbals (Dv), and scalar analysis demonstrated them to be developmentally later.

This difference seems unlikely to be related to such surface facts as the position of the affix. Research by McWhinney (1978) and Slobin (1973), and others suggests that affixes in word-final position should be easier, not harder, to learn than affixes in word-initial position, all else being equal. Therefore, it seems more likely that the difficulty of production of the denominals was related more to the function of the suffix, i.e. to change grammatical class, than to the affix position in a verb. Support for this hypothesis comes from a comparison of results from the screening and experimental tasks. Recall that the screening task contained items requiring either inflectional or derivational suffixes. While the overall correlation in performance between the screening task and performance on the denominal items was .51, the correlation between derivational suffixation in the screening task and performance on the denominal items was .63. This suggests that control of derivational processes, not merely suffixation, was the important factor.

Data from this study indicate that control of derivational processes emerges during the school years, rather late in language development. The 9's were the only group who reached the 50% performance level on existing denominal items, and even these oldest
children performed far below that level on hypothetical forms. Contrary to the findings in my study, Chmura-Klekotowa (1967, 1968) provided evidence for the presence of innovative denominal forms in the spontaneous speech of children as young as 2;8. Her subjects not only produced simple denominal forms, but also prefixed them. Clark's (1982) data referring to other languages (English, French, Italian, German) is consistent with Chmura-Klekotowa's findings. Clark suggests that the young children she examined had already acquired the rule for creating innovative denominals. This rule can be described as: "Any noun denoting a concrete entity can be used as a verb for talking about a state, process, or activity associated with that entity" (Clark, 1982, p. 424). Based on her conclusions I ask the following question: If children have, indeed, acquired such a rule for creating denominals at an early age, why have I obtained contradictory data?

The larger child language literature provides some insight into my results in discussions of "lexical gaps" and "productivity". Clark (1982) and Chmura-Klekotowa (1967, 1968) agree that children create innovative denominals "to fill gaps in their current lexicon" (Clark, 1982, p. 424). Based on this assumption, it seems reasonable to suggest that my subjects "resisted" the invitation to create a hypothetical verb because they had other, familiar verbs at hand. If that were the case, I could expect that if children were able to describe an event with a known verb, they would not try to form a derivative. Error patterns suggest that the "lexical gap" phenomenon may even pertain to production of the existing denominal items. Close to one third of the errors made by children aged 3 to 7 on these items again involved the substitution of common verbs. Although the targeted
denominals were judged by the experimenter to be in wide use, some children may not have been familiar with them, minimizing the distinction between existing and hypothetical denominals. The existing deverbal and denominal items chosen for the experiment were: 1) to bake, 2) to clean, 3) to stop, 4) to glue in, 5) to wallpaper, 6) to dye.

There is the possibility that better results on the existing than on the hypothetical denominals might have been related to the way highly frequent forms are acquired. According to Bybee "highly frequent forms are learned by rote memorization, and stored and processed as unanalyzed units" (1985, p. 212). Thus, if some lexical items were learnt by rote memorization, then the subject’s performance on the existing deverbals and denominals might have, indeed, reflected a frequency of occurrence effect rather than productive control of derivational processes.

The picture does not change much if we take the unlikely position that all of the existing denominal items were unknown to the children and hence should also be considered strong tests of productivity. The data say that at ages 5 and 7, only 53% of the responses included a denominalized verb while at age 3 only 32%. Although lexical gap arguments create some uncertainty, these values seem low if children indeed achieve productive control of denominalization in the preschool years. And, of course, these values would be even lower if children’s successes were due to the use of familiar, unanalyzed words and therefore removed for the final analyses.
Providing children with novel stems and asking them to expand the stems with the required morphemes seems to be the stronger test of children's knowledge of morphological rules (Berko, 1958). According to Berko, fully productive control of grammatical morphemes is formed only after a period of spontaneous use and presumes grammatical analysis. If my subjects had analyzed their extant denominal verbs, knew how to use suffixes, inflectional and derivational, and understood the functions they served, they would have succeeded on the novel and potential denominals. Data from this study show that the only group who succeeded in producing any item in these two categories was the oldest group. This explanation seems to confirm the prediction that children younger than 9 years have not mastered a morphological rule that would help them to produce a denominal verb upon request.

I also have to consider the possibility that some children's derivational skills were sufficient to derive a verb based on a given nominal stem. However, since the children had never been asked to perform such a task, they may not have known that they were being asked to use this derivational knowledge. This possibility should be addressed in future research. For now, I suggest that poor performance on production of denominals is partially the result of inadequate derivational skills, seen here as a lack of mastery over the denominalization rule.
Prefixation

Based on the review of the literature of the acquisition of aspect in different languages (Polish, English, Italian, French, Russian), and on findings on expansion of the meaning of a verb (locativeness in particular) through the use of prefixation (Weist & Konieczna, 1985), I made the prediction that prefixation itself should not impede acquisition of prefixed denominal causatives. I expected that the children participating in my study would use prefixes to express aspect and, at the same time, would use them to expand the meaning of a verb. Finally, I also expected that children would be more successful with those prefixes whose meanings do not overlap, those that are semantically more transparent, and those that are most frequently occurring in Polish.

The data show that overall production of prefixes (in close unwanted words and in targeted deverbal and denominal verbs) was 83% (60% in the 3’s, 78% in the 5’s, 96% in the 7’s and 99% in the 9’s). The most supportive evidence for a widely produced prefix with either targeted or nontargeted stem was the use of prefixes in the youngest age group (67% for deverbals, 78% for denominals, 53% in potential denominals and 42% in novel denominals). These numbers increase for the older groups. This finding supports my expectation that prefixation, contrary to derivational suffixation, was not a difficult process in the production of the targeted verbs.

Two explanations for the ease with which children prefixed verbs might be possible. The first one suggests that children may know only one function of the prefixes which would
make their use considerably simpler. By this argument, with their use of a prefix children might be expressing either perfectivity or expanded verb meaning, or perhaps even basic causality, but not all of these notions at once. Use of the prefixes to express a basic causal relationship seems unlikely. Virtually all semantic analyses of these forms judge their meanings to be aspectual and locative, manner, etc., as discussed in Chapter 1. While the prefixes can describe some feature of the end state of the causal event, and further indicate that the end state has been reached, they do not seem to refer to the causal relation itself. Moreover, each of the denominal stems in this study can be used in some context, without a prefix, to convey the causal meaning. Take, for example, the notions conveyed by the verb *farb-owa-w* 'dye - verbal suffix - infinitive marker', or the same verb prefixed with the prefix *u-, u-farb-owa-w* 'all over + PFV - dye - verbal suffix - infinitive marker'. It is possible to use *farbować* without a prefix in sentences as 'I was dying my shirt'. Such use of the unprefixed verb has clear causal meaning, indicating that dye has been applied over all surfaces with a clear effect. Similar analyses would be possible for the other denominal verbs. Children may, of course, make semantic mapping errors and, for example, believe that the prefix is necessary to convey causal meanings. This study was not designed in a way that allows exploration of prefix meanings in detail. Since it focused on prefixation as just one of many processes involved in the production of prefixed denominal causatives, it did not provide sufficient information to discuss this possibility.

The second explanation refers to Weist’s studies (1983; Weist et al. 1984; Weist & Konieczna, 1985) and his claim that, by 2;6, children have acquired the ability to convey
aspect and expand meaning of a verb through the use of prefixes. What needs to be remembered is that Weist and Konieczna (1985) based their findings on children's comprehension and spontaneous production of aspectual and locative prefixes in the existing verbs, all deverbals. In my opinion, a more revealing method of examining children's use of prefixes is to examine production of hypothetical prefixed verbs, i.e. the novel and potential denominals. By examining such production, I would lose subjects with poor suffixation skills who did not produce any of the hypothetical denominals, but I could eliminate the rote memorization factor, which might have aided children in production of the existing deverbal and denominal items.

As was presented earlier, the overall performance on production of novel and potential denominal causatives was very poor. There were only 33 of 288 (10.4%) denominal causatives found in these two categories, most of them (21) in the novel category. In three instances the derivatives (one in the 3’s, two in the 7’s) were unprefixed. The rest of the derivatives were prefixed, most of them with nontargeted prefixes (20). The majority of prefixed responses were found in the 9’s (24 of 30 prefixed responses). In spite of the small number of denominal verbs produced in the novel and potential categories, I can conclude that children who produce these denominal forms do not have difficulty with prefixing them. Now, I should try to explain this phenomenon.

Since the subjects had never heard these hypothetical verbs before, and since prefixation functions as a means of conveying perfectivity and expanding verb meaning, I can
speculate that the children who produced prefixes, conveyed both notions simultaneously. As was mentioned earlier, prefixation is a very challenging topic in Slavic morphology, and to answer the question as to what degree a particular instance of prefix use conveys perfectivity and to what degree it expands the meaning of a verb, more focused research is required. Nevertheless, based on Weist's findings that children convey aspecual information by age 2;6, I can make the assumption that the notion of aspect is easy to express. Virtually, all prefixes used with the verbs in this study convey perfectivity, thus the use of any prefix may indicate that a child "knows" how to express aspect. The wide use of prefixes in this study, even by the 3's, is certainly compatible with Weist's claim that the aspectual meaning of the prefixes is learned early.

Despite their fluent production of aspectual prefixes, however, children made frequent grammatical errors in their selection of specific prefixes from among the set of 16. The fact that these errors were not random (e.g. that children never used prefixes pod- 'under', nad- 'above', or do- 'towards', which meanings would be very remote from the targeted ones) suggests that children intended to express some expanded verb meaning, but their choice of using nontargeted prefixes suggests that they were having difficulty in determining the specific expansion features associated with each prefix. This was true for targeted and nontargeted stems in deverbal and denominal items. Let's try to find an explanation for the fact that children make prefix errors in the well-known verbs. It would be logical to assume that after children hear frequently occurring prefixed verbs in every-day speech, they should learn the meanings conveyed by prefixes attached to different
verbs. What makes this learning difficult is the fact that some of the frequent lexical forms expressing almost the same meaning differ in regard to prefix choice (e.g. wy-prać 'to wash completely' vs. prze-prać 'to wash a little') and that the same prefix may convey different meaning when attached to different stems (e.g. the prefix roz- in roz-grzać means 'to warm up' and in roz-pać means 'to fall in pieces'). It seems reasonable to believe that children who have difficulties with semantic analysis of prefixes would indicate such difficulty by making a prefix error. Such prefix errors would be seen not only in verbs they have never heard and were asked to produce, but also in their recall of the well-established ones. There are some reasons to believe that working out the meaning of the prefix can be difficult and may be influenced by a semantic transparency and frequency of occurrence.

Brown's (1973) study on acquisition of grammatical morphemes in English shows that the order of acquisition of grammatical morphemes depends in part on the semantic transparency of a morpheme. It also suggests that if one morpheme combines the meaning of two morphemes, then the one that is more transparent (semantically) and more general would be produced more often and acquired earlier. In several aspects of the present data, we observe similar mechanisms for production of Polish prefixes. First, the prefix po-which can convey many meanings was the most commonly used in substitutions (Weist & Konieczna, 1985). Since it is a very frequent and phonologically easier than other prefixes, I may conclude that it might have been frequently used as a default prefix. Weist's study also showed that this prefix is acquired as the earliest. Second, analysis performed prior
to the experiment indicated that the prefix za- was considered as the most transparent of the three, and the prefixes wy- and u- were not only less transparent, but also overlapping in meaning. This study shows that the prefix za- was the most commonly used, both in obligatory contexts and in substitutions (62.5%), followed by the prefix wy- (39.6%), followed by the u- (35.9%). This seems to confirm the general prediction that the incorrect use, or lack of use of prefixes seems to have one source in the lack of transparency of the semantic mapping.

Another factor accounting for prefix use might be related to the frequency of occurrence of different prefixes. I would expect that, all else equal, the more frequently occurring prefixes would be used more successfully than those occurring less frequently. If that were the case, then the prefix u- would have been used correctly with the most frequency, and the prefixes wy- and za- would have occurred less, but with equal frequency. Since the prefix za- was the most correctly used in its obligatory contexts, therefore I can conclude that frequency of occurrence, by itself, does not seem to be a good predictor of the acquisition of verbal prefixes. However, if we combine this factor with semantic transparency, the combination may account for acquisition patterns. Note, for example, that the previously mentioned prefix po- is both semantically transparent and frequently occurring.

In sum, the acquisition of prefixed denominal causatives is a function of both derivational and semantic knowledge. The derivational part refers to the process of suffixation
accompanying the change of a grammatical class of a word, while the semantic part refers particularly to the meaning expansion provided by prefixes. This study provided evidence that suffixedation, as a derivational skill, is a good predictor of performance on prefixed denominal causatives. Prefixation, in context, does not seem to impair children’s performance. This may be explained by the fact that prefixation does not cause any changes in grammatical class of a word. Prefix errors, frequently observed, indicate difficulties with semantic analysis of particular affixes, and are present not only in the responses of the 9-year-olds in their novel and potential denominals, but occur in all types of children’s close unwanted words (usually the well-established verbs) and also in adults’ responses. The claim that semantic analysis of a prefix is a good predictor of children’s performance was confirmed by this study. Another claim that frequency of occurrence of prefixes is also a good predictor was not confirmed.

Overall, this study indicates that the acquisition of prefixed denominal causatives is a function of both derivational and semantic knowledge. The findings from this study seem to be consistent with Tyler & Nagy’s (1989) findings that knowledge of different aspects of derivational knowledge continues to develop through the years of elementary schooling. Other cross-linguistic data (Slobin, 1966; Berman, 1985) also show that the process of acquiring full mastery over the morphological system of one’s language does not proceed with great speed and is "stretching from early 'toddlerhood' to well into the school years" (Tager-Flusberg, 1985, p. 154). As can be seen from my results, a level of derivational knowledge which enables children to produce prefixed causal denoms (on novel stems
in particular) may only be seen in the 9-year-olds. Difficulty with meaning expansion through prefixation, seen also in the adult speakers of Polish, can be explained by the polysemic function of prefixes which decreases the degree of prefix transparency. It can be predicted that if a prefix is semantically transparent and frequently occurring, it should be acquired earlier than that which is not.

METALINGUISTIC SKILLS

Although there are good reasons to believe that acquisition of the derivational skills required for the production of denominal causatives is not fully achieved until the school years, there is one further possibility that must be explored. It may be that the relatively poor performance of the younger children on all items and of the older children on the hypothetical items, can be attributed to limited metalinguistic abilities. Perhaps children really had knowledge of the relevant derivational patterns, but did not understand that they were meant to demonstrate this knowledge in the experimental task. One way to assess this possibility is to look at children's use of examiner's cues. Recall that if a child produced at least one targeted response prior to the breakdown, such a response was recalled by the examiner and given as one of the cues. It seems reasonable to suggest that children who have acquired the ability to analyze word forms and were able to reflect on this knowledge, would have succeeded in production of new derivatives for which the rule was implicitly, but rather clearly, defined in the given cue. However, data show that there was a large number of children who failed to produce targeted responses in spite of a variety of cues provided. This may suggest that some children failed to do the task due to their
inability to consciously analyze the underlying morphological form of an expected target, in this case: prefix + noun stem + verbal suffix.

The results showed that there is almost no difference in the use of cues among the 3's, 5's and 7's, who utilized the cues with a similar rate. Since there were not many cases of unprefixed verbs, all responses that were denominalized and unprefixed, or prefixed with either targeted or nontargeted prefix were taken as a base for establishing the percentage of cue use in all groups. There were only 12% of responses which improved with the use of cues in the 3's, 18% in the 5's, 19% in the 7's, and 65% in the 9's.

A supporting evidence for this argument that children fail to perform some linguistic operations due to their inadequate metalinguistic skills comes from the research of Lahey. Based on research of others (Weir, 1964; Gallagher, 1977; Van Kleeck, 1984) she suggests that "language awareness begins early [my note: in preschool years], but in comparison to later behaviors, it is tied to meaning and communication. Operating on language apart from meaning (e.g. talking about sentences and parts of speech) appears to await further experience with language, as well as cognitive development, and most likely, schooling" (Lahey, 1988, p. 286). This study shows that the probability to perform well (above the average score for one's age group) on my experimental tasks may indeed be related to a child's school achievement. High achievers who, I assume, would show a higher level of cognitive development than average achievers were more likely to perform above average for their age group than the average achievers. A good example of
association between on-task performance and cognitive skills might be the performance of a girl who was able to produce one novel denominal at age 2;8. She was introduced to the examiner as a child whose performance was thought to fall above average for her age group in all developmental areas.

While there is the possibility that children's performance in this study reflected the metalinguistic demands of the task, metalinguistic limitations do not seem adequate to explain the poor performance. When examining the use of the cues two aspects seem to be very interesting. First, it seems that the 9's had indeed greater metalinguistic abilities which influenced their performance on the experimental task. In this regard, though, it seems surprising that given these apparent metalinguistic abilities, their performance was as low as it was. Second, according to van Kleeck's findings (1982, 1984) the 7-year-old children have considerable metalinguistic skills. If it is true, the lack of success in using cues seen in the 7's in my study may be attributable to the lack of knowledge of derivational processes rather than any broad metalinguistic failing. Also, based on the differences in performance between high and average achievers, it seems likely that a combination of metalinguistic and cognitive knowledge might be a better indication of children's performance than the metalinguistic skills alone. The correlation between metalinguistic, cognitive, and derivational skills should be addressed in future research.
CONCLUSIONS

This study showed that acquisition of prefixed denominal causatives follows a predictable order of development and that control over production of these forms emerges during school years, rather late in language development. The beginning of rule formation for production of tested denominals was seen in the 9-year-olds, however, individual variability was observed in regard to age of acquisition.

The invariant sequence of acquisition seems to be determined by children’s derivational and semantic knowledge. Suffixation as a means of denominalization was the most difficult operation in the acquisition process. A second difficult step was meaning expansion through the use of appropriate prefixes. The other factors, such as linguistic expression of causality, phonological and phonotactic skills, prefixation as a means of conveying perfectivity, and metalinguistic knowledge, did not prove to be good predictors of performance on prefixed denominal causatives, however, more research is needed to estimate their involvement in the acquisition process.

With these conclusions in mind, I can imagine that prefixed denominal causatives have the following developmental history. I suggest that acquisition of verbs is a prerequisite for production of denominal verbs. When a child begins to use words to describe actions he first produces verbs which are associated with well known-situations. The first verbs acquired would also be those which refer to frequently occurring relations. Most of the deverbals and denominals he produces are learnt through rote memorization. If he does
not know an appropriate deverbal or denominal, he may produce an innovative one. Although his innovations may be completely grammatical, the rule he uses for their production is not fully internalized yet. When a child produces a prefixed denominal causative at the age of around 2;0, he is not aware of all of the derivational processes needed for such a production. At this stage he may denominalize a noun for a more precise description of an event. When he uses a prefix, he may be aware of two functions associated with it (perfectivity and meaning expansion) and will attempt to convey both. He will be more successful with conveying perfectivity since this notion is inherently tied up to the meaning of prefixes, but he will experience difficulty with meaning expansion. At this stage some children may use targeted prefixes, which suggests that they perform a more thorough semantic analysis, however a more detailed morphological and semantic analysis of prefixes is performed a little later. That a child is able to produce prefixed deverbals and denominals does not, yet, predict his success on production of potential and novel denominals. It is only when children improve in derivational, metalinguistic and cognitive skills, they proceed to the denominalization stage. Now they begin to produce denominal verbs based on any given nominal stem. Once a child is able to convert a noun into a verb, he usually produces it with a prefix. The morphological and semantic analysis of prefixes began during earlier stages, therefore a child makes fewer prefix errors during this denominal stage. Metalinguistic and derivational knowledge together tell him what the surface structure of a new word should look like. If he still has difficulty performing the task, he can now take advantage of cues addressing them. Prefix error may still be seen in the final stage. Adult data suggest that prefix error can also be seen in the speech of the
adult speakers of Polish. This difficulty with choosing the appropriate prefix is related to
the fact that meanings of prefixes overlap and some prefixes may be used more commonly
by some people and less by others. Also, the differences between meanings of two prefixes
may be so subtle that only a thorough linguistic analysis of a prefix and a stem to which
a prefix is attached, can justify a decision about the choice of a prefix.

IMPLICATIONS FOR FUTURE RESEARCH
The results of this study indicate some directions for future studies on acquisition of
language, especially, acquisition of derivational morphology. Since this study was pre-
theoretical, one direction is to investigate the validity of the findings. The results of this
study indicated that the order of acquisition of prefixed denominal causatives is predictable
despite the differences in the timing of acquisition. One way of examining the validity of
this finding would be to conduct a longitudinal study with the same subjects and observe
whether every child follows the same order of acquisition. Another way might be to
conduct a cross-linguistic study on children speaking other Slavic languages, e.g. Russian,
and investigate order of acquisition of equivalent structures in those languages. It is
reasonable to expect similar findings, however, I can not exclude the possibility that if
other types of procedures were used, the studies would yield different results. Assessing
children's comprehension of these structures might also enrich the results on acquisition
of prefixed denominal causatives.
Another area for future research is to investigate the acquisition of children's derivational and semantic skills separately. Since the research of Clark (1982) and Chmura-Klekotowa (1967, 1968) showed that children younger than 3 are able to produce innovative denominal verbs, and since this study seems to indicate that the denominalization rule was used consciously (acquired) much later, i.e. at around the age of 9, it might be useful to conduct a study in which children would be asked to denominalize nouns (existing and hypothetical) without prefixing them. However, since "lexical gap" phenomena might have influenced the results of this study, another procedure for investigating children's knowledge of denominalization rules should be considered. A separate study on prefixation of already denominalized verbs could help examine children's acquisition of semantic notions conveyed by prefixes. Again, it would be interesting to conduct such studies cross-linguistically. In addition, some subjects younger than these who participated in this experiment might be tested to see if they, indeed, show no signs of productive denominalization skills, and some older subjects (older than 11) to see if they all have the rule for production of prefixed denominal causatives fully acquired.

There is also a need to explore the role of metalinguistic and cognitive skills in the development of derivational morphology. This study indicated that only the 9's made use of their metalinguistic skills in that they took advantage of the cues given by the examiner, and that high achievers performed better than average achievers. Although I suggested that the metalinguistic and cognitive skills seemed to play a secondary role in the successful performance of production of prefixed denominal causatives, the literature suggests that
these skills are closely related to the derivational skills (Lahey, 1988) and such interaction should be further investigated.
BIBLIOGRAPHY


Mieczkowska, H. (1985). Denominalne derywaty czasownikowe o formantach prefiksalsko-
sufiksalskich w języku polskim i słowackim (studium kontrastywne). Wroclaw: Ossolineum.


APPENDIX A

Letter and Consent Form sent to parents

Letter (translation from Polish):

Project title: Acquisition of Polish vocabulary.

Investigators:
Krystyna Wrobel  M.Sc. student (U.B.C.)  (604) 873-3766
Judith R. Johnston  Professor, Audiology and Speech Sciences (U.B.C.)  
(604) 822-5591

We are asking your consent for your child to participate in a research project currently underway through the School of Audiology and Speech Sciences at the University of British Columbia with cooperation with the Preschool No.96 in Cracow, Poland, and Elementary School No.81 in Cracow, Poland.

In order to be fluent speakers of Polish, children must learn how to create new words, for example, how to make the word 'driver' out of the word for 'drive'. Psychologists and linguists relate such word creation process to more general levels of language development. This study will focus on development of linguistic creativity in preschool and early school years. The results of the study will provide teachers and educators with more information on how to facilitate acquisition of language.

Project Activities: If appropriate, your child will participate in one or two procedures designed to investigate the way Polish children acquire conventional word forms. Your child will be asked to talk about school or play, to name some pictures, and then to watch nine very short (2-3 minute each) video scenes which he/she will describe afterwards.

Your child's total investment in this project will consist of approximately two to three 20-minute sessions within the eight week period beginning June 1, 1994 and completing in August 1, 1994. All sessions will be conducted at your child's preschool by Krystyna Wrobel, a graduate student from the School of Audiology and Speech Sciences at the University of British Columbia. Any audio-tape records of your child will be kept at U.B.C. and will be used only by project researchers. Reports of the project will focus only on group data. Any reference to individual subject performance will use numbers or initials to ensure anonymity.
In our experience, children enjoy participating in projects such as this and enjoy the chance to demonstrate their language skills. If you or your child choose not to participate in this project or wish to withdraw at any time, you are under no obligation. Such a decision will in no way jeopardize your child’s quality of educational services he/she is currently receiving.

If you have any further questions or concerns regarding the procedures listed above, please do not hesitate to contact Ms. Malgorzata Kubik, the Director of the Preschool No. 96 in Cracow, Os. Zielone 27 prior to June 10, 1994 or Ms. Krystyna Wrobel at 48-49-98 (Cracow) after June 10, 1994. If you would like to contact the author of the study prior to June 10, 1994, please write at the address: Krystyna Wrobel; c/o School of Audiology and Speech Sciences: the University of British Columbia: 5804 Fairview Avenue: Vancouver, B.C.; V6T 1Z3: CANADA.

Sincerely

Krystyna Wrobel
Consent Form:

(child's name)

CONSENT FORM

I consent to the participation of my child in the project: "Acquisition of Polish Vocabulary". I am fully aware of the purpose and objectives of this project, and all procedures have been clearly explained to me. I understand that my identity and that of my child will be kept completely confidential.

I understand that my child is under no obligation to participate in this study, and I am free to withdraw him at any time.

I have retained a signed copy of this consent form for my own records.

Please, check one:

I consent to my child's participation in this project. __________________

I do not consent to my child's participation in this project. __________________

Signature of Parent/Guardian __________________ Date __________________

PLEASE RETURN THIS COPY TO PROJECT INVESTIGATORS
APPENDIX B

Word Derivation Task. List of Items.

I. Derivational agentive suffixes:

1. pis-arz 'a man writer'
   Question: What do you call a man who writes?

2. pis-arka 'a woman writer'
   Question: What do you call a woman who writes?

3. mal-arz
   Question: What do you call a man who paints?

4. mal-arka
   Question: What do you call a woman who paints?

5. plyw-ak
   Question: What do you call a man who swims?

6. plyw-aczka
   Question: What do you call a woman who swims?

II. Inflectional diminutive suffixes:

7. dziewczyn-ka
   Question: What do you call a little girl?

8. jabl-uszko, or any other diminutive form
   Question: What do you call a little apple?

9. dzban-ek, or dzban-uszek, or dzban-eczek
   Question: What do you call a little jar?

III. Derivational adjectival suffixes:

10. jablk-owy
    Question: What do you call juice made of apples?

11. gruszk-owy
    Question: What do you call juice made of pears?
APPENDIX C

Phonotactic Task. List of Items (hyphens indicate syllable border).

1. ku-piec
2. pod-ło-ga, or po-dło-ga
3. nur-ko-wać
4. no-ta-tka, or no-tat-ka
5. ka-len-darz, or ka-len-darz
6. po-dno-sić, or pod-no-sić
7. ma-je-ra-nek
8. man-do-li-na
9. na-ry-so-wać
10. po-dusz-ko-wiec, or po-du-skó-wiec
11. po-za-my-kać
12. re-gu-la-min
13. od-ga-zo-wać
14. o-pa-le-niz-na, or o-pa-le-ni-zna
15. au-to-ma-ty-czny, or au-to-ma-tycz-ny
16. fo-to-gra-fi-czny, or fo-tog-ra-fi-czny, or fo-tó-gra-ficz-ny
APPENDIX D

Video scenes description.

Category 1. Existing Prefixed Deverbal Causatives

a) Base verb: hamować 'to stop by breaking'
Expected derivative: za-hamowal '(He) stopped (the car) completely by breaking'

Description: A driver drives a car. He says: Będę hamować 'I will stop', Teraz będę hamować 'Now, I will stop'.

b) Base verb: czysścić 'to clean'
Expected derivative: wy-czyścił '(He) cleaned (the shoes) completely'

Description: A man walks down the street. The shoe cleaner sees the man and says: Będę czysścić '(I) will clean'. The man comes up to the shoe cleaner and sits on the chair. The shoe cleaner says: Teraz będę czysścić 'Now, (I) will clean'. The shoe cleaner cleans the man's shoes until they are completely clean.

c) Base verb: piec 'to bake'
Expected derivative: u-piekł '(He) baked (the cookies) completely'

Description: There are ingredients for baking cookies on the kitchen counter. A man looks at them and says: Będę piec '(I) will bake'. He mixes all ingredients together, places cookie dough on the baking dish and says: Teraz będę piec 'Now, I will bake'. He opens the oven and puts the baking dish inside the oven. After the cookies are ready, he takes them out of the oven.

Category 2. Existing Prefixed Denominal Causatives

a) Base noun: klej 'glue'
Expected derivative: za-kleiła '(She) completely glued (the envelopes)'

Description: A girl sits at the table. A boy stands behind her, hiding two bottles of glue behind his back. The girl puts letters into envelopes and wants to seal them. She says: Gdzie jest klej? Ja potrzebuję klej 'where is glue? I need some glue'. The boy shows her the glue and she takes it. Then she glues the envelopes.
b) Base noun: tapeta 'wallpaper'
Expected derivative: wy-tapetowal '(He) wallpapered (the walls) completely'

Description: A man comes into a room with a cloth and a basket filled with water. He looks around and says: Gdzie jest tapeta? Potrzebuje tapete 'Where is wallpaper? I need wallpaper'. He sees some wallpaper in the corner of the room, takes it and puts it on the walls. He wallpapers the walls completely.

c) Base noun: farba 'dye'
Expected derivative: u-farbowala '(She) dyed (her doll’s hair) completely'.

Description: A girl stands at the table, holding a doll with red hair in her hands. There is some black dye in a jar on the table. The girl says: Gdzie jest farba? Ja potrzebuje farbe "Where is dye? I need some dye'. Then, she dyes her doll’s hair completely black.

Category 3. Potential Prefixed Denominal Causatives

a) Base noun: guziki 'buttons'
Expected derivative: za-guzikowala, or za-guziczyla '(She) buttoned (the pillow case) completely'

Description: A girl sits on the sofa bed holding a pillow case with a pillow inside it. There are no buttons, only button holes on both sides of the pillow case. There are buttons on the table. The girl says: Gdzie sa guziki? Ja potrzebuje guziki "Where are the buttons? I need some buttons'. She sees the buttons, takes them and attaches them to the pillow case and fastens the buttons.

b) Base noun: szampon 'shampoo'
Expected derivative: wy-szamponila, or wyszamponowala 'She shampooed (the toy cat) completely'

Description: A girl finds a toy cat on the ground. It is dirty. She says: Gdzie jest szampon? Potrzebuje szampon 'Where is shampoo? I need shampoo'. She finds shampoo and pours it all over the toy, then "shampoos" it, leaving the foam on it.

c) Base noun: stokrotki 'daisies'
Expected derivative: u-stokrotkowala, or ustokrotczyla '(She) daisied (her basket)'

Description: A girl walks in the park, holding a basket in her hands. She stops at the stream and says: gdzie sa stokrotki? Ja potrzebuje stokrotki 'Where are daisies? I need some daisies'. She looks around and sees onto the field. She finds the daisies, sits on the grass, picks some and places them around the upper edge of the basket.
Category 4. Novel Prefixed Denominal Causatives

a) Base word: krzam (a "special" substance used for filling-in holes)
   Expected derivative: za-krzamiła, or za-krzamowała '(She) filled (the hole in the fence)
   with the "special" substance'

   Description: A girl walks along the fence. She notices a hole in it. She says: Gdzie jest
   krzam? Ja potrzebuję krzam. 'Where is the krzam? I need some krzam'. She sees krzam
   and fills in the hole in the fence until it is completely filled in.

b) Base word: pszon (a "special" cover used for lining the trunk of a car)
   Expected derivative: wy-pszonil '(He) lined up (the trunk of a car) with the "special"
   cover'

   Description: A man leaves his car, opens the trunk which is not lined up with anything.
   He says: Gdzie jest pszon? Potrzebuję pszon 'Where is the pszon? I need the pszon'. He
   opens the back door of his car and finds the pszon and lines up completely the trunk of
   his car.

c) Base word: nidlo (a 'special' substance found on the surface of water)
   Expected derivative: u-nidlila, or u-nidlowała '(She) muddied (shoes) with the use of a
   "special" substance found on the surface of water'

   Description: A girl walks along the pond. She stops and says: Gdzie jest nidlo? Ja
   potrzebuję nidlo 'Where is the nidlo? I need the nidlo'. She sees nidlo on the surface of
   the pond and purposefully covers her shoes with it.