

THE STRUCTURE OF THE ENVIRONMENTAL RELATIONSHIP
IN POLAR REGIONS

by

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Abstract

Two studies were conducted to examine the environmental relationship of the polar sojourner (a temporary dweller of the Arctic or Antarctic). Noting similarities between the concept of place attachment in environmental psychology and theories regarding close, interpersonal relationships in social psychology, these studies take as their starting point Sternberg's (1988a) triangular theory of love. This theory holds that the *structure* of love is characterized by three orthogonal dimensions: Passion, Intimacy, and Commitment. Sternberg's model was translated into person-environment terms and expanded to include love's opposite. The *process* of the environmental relationship was examined using two groups of polar sojourners: Novices (less than six months experience) and Old-Hands (greater than six months experience).

In Study 1, independent raters used definitions derived from Sternberg's model to rate the strength of each dimension exhibited in the interviews of twenty-five Antarctic and eight Arctic sojourners. Study 2 collected self-ratings from thirty Arctic sojourners. In both studies, rater feedback indicated that the interpersonal model is a viable approach but correlational analysis of the three dimensions indicated that environmental love is actually a monolithic construct. The results from Study 1 suggested that Novices held a greater love of the polar regions than did Old-Hands; the results of Study 2 suggested the opposite. These disparate findings were reconciled in an examination of the differences in environmental love between Base Camp and Field Camp personnel in Study 2, where it was found that Old-Hands whose most recent experience was in a field camp held the greatest amount of love for the polar region. This suggested that wilderness experience may be a goal of polar sojourners. This goal is most likely to be met in Novices because they are experiencing the polar region for the first time, and by Old-Hands in the field because they know that what they are experiencing is truly polar wilderness. Old-Hands in a base camp setting (the primary type of site for Study 1) may be frustrated in their wish to explore the natural polar environment. Future directions include the examination of less extreme environments and incorporating social elements into the model.

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Preface

The birth of this dissertation can be traced to a single conversation. My Ph.D. advisor had just returned from the high Arctic and was informing me, in no uncertain terms, about the merits of the region.

"So you really liked it?" I asked.

"I love it", he replied.

At that time, I had had no direct experience with any polar region and, having a somewhat naive view of the area (high winds, excessive cold, and otherwise extremely unpleasant living conditions), I found his assertion hard to believe. After a little more impassioned oratory on his part, however, I was ready to concede that he did, indeed, "love" the place. I was also struck by the intensity of the emotion he displayed: It was as though he quite literally did have a new romance in his life.

After more than a few trips to Places Somewhat Frozen, I would like to offer a comment regarding my own relationship with the polar regions. While conducting research at these sites fits in well with my general area of interest, namely extreme and unusual environments (Suedfeld, 1987), frankly, the idea of spending my summers in such odd places as Antarctica and the high Arctic now holds a strange appeal. But then, I suppose this may say more about the researcher than the research...

Many people have supported me in my polar endeavours and throughout this dissertation. In the academic realm, I would like to express my gratitude to: Dr. Stan Coren, for his time and expertise, Dr. John Stager, for Arctic wisdom and polar tales, Dr. Daniel Perlman, for direction at the critical crossroads, and Dr. Larry Palinkas, for much support and encouragement. Outside the airy world of university life, Dennis Stossel, Jim Godden, and Roberto Vallverdu have each provided me with invaluable guidance regarding life in the field.

Four separate organizations contributed funding and/or logistical support. In the Antarctic, assistance was rendered by the Instituto Antartidad de Argentina and by the United States National Science Foundation. In the Arctic, I am indebted to the Canadian Polar

Continental Shelf Project and the Canadian Atmospheric Environment Service (Central Division).

I would also like to thank each and every one of the people I interviewed for sharing their "story" with me.

There are three people who have, without fail, sustained me throughout all the toil, trouble and joy of my many polar seasons. They hold a special place in my life and so I would like to offer my most heartfelt thanks:

To my wife, Lauren Steel, who gave me the strength,

To my advisor, Peter Suedfeld, who gave me the opportunity,

And especially to my father, Bob Steel, who is with me always, everywhere...

INTRODUCTION

The appeal of a specific place is a feeling familiar to most people. Whether it is raw wilderness or one's hometown, people are generally able to nominate a favourite place, one to which they feel somehow "connected". More often than not, the climatic conditions and types of physical features associated with these places are not far removed from those experienced in these people's day-to-day lives.

This is not the case for the regions that are the focus of the research to be described below. This thesis focuses on an environment that is both *extreme and unusual* (Suedfeld, 1987). In particular, it investigates the relationship between polar sojourners (non-indigenous, temporary dwellers) and the polar regions. Much has been written about the stressful characteristics of the polar regions. High winds, cold temperatures, confinement to a small group and limited access to help in emergencies are among the many unpleasant features cited in both the popular and academic literature pertaining to the areas. The fact remains, however, that people choose to visit and return to the Arctic and Antarctic. These sojourners often overcome hurdles, both financial and personal, that would dissuade all but the most ardent of applicants from even making the attempt.

What is the nature of this attachment? Is it truly possible to form a bond with such an apparently inhospitable environment?

These two questions are at the basis of this thesis. The study of the ties to a particular locale has come to be known in environmental psychology as place attachment research, and place attachment is, in all respects but one, at the heart of this study. We shall therefore begin with an overview of the theoretical side of this literature.

Place Attachment

The study of one's attachment to a given place is very new in psychology. It was not listed as a heading in the index of the latest Handbook of Environmental Psychology (1987), and the first edited collection of papers did not appear until the winter of 1992 (Altman & Low, 1992), although work in the area had been conducted somewhat earlier (Gerson, Steuve, & Fischer,

1977; Shumaker & Taylor, 1983; Taylor, Gottfredson, & Brower, 1985). Despite the fact that the area is in its infancy, there are indications that it will become one of the more influential and motivating forces in environmental psychology. This is not a lightly-made statement: The concept of place attachment cuts across all current research domains in environmental psychology and it has theoretical links to other areas of psychology and to other disciplines.

While a number of writers have sought to shed some light on the nature of one's affective ties to a place (see, e.g., Eliade's, 1957, description of how places become sacred), one of the earliest scientific efforts was made by Tuan (1974), in his work on *topophilia*, or place-preference. In his words, topophilia

is a neologism, useful in that it can be defined broadly to include all of the human being's affective ties with the material environment. These differ greatly in intensity, subtlety, and mode of expression. The response to environment may be primarily aesthetic: it may then vary from the fleeting pleasure one gets from a view to the equally fleeting but far more intense sense of beauty that is suddenly revealed. ...Topophilia is not the strongest of human emotions. When it is compelling we can be sure that the place or environment has become the carrier of emotionally charged events or perceived as a symbol. (p. 93).

This definition is relatively narrow in that affect is seen as the sole characteristic of place preference and cognitive and behavioural components are virtually ignored. It is perhaps this reason that has led to topophilia being well-cited but rarely empirically investigated as an independent construct. As a topic area, it tends to be included as a component of other models of place attachment.

Most of the early work in what was to become the place attachment literature was similarly limited in its dimensionality. Place-identity (Proshansky, Fabian, & Kaminoff, 1983) was defined as a "sub-structure of the self-identity of the person consisting of, broadly conceived, cognitions about the physical world in which the person lives" (p. 59). Place dependence (Stokols & Shumaker, 1981) "describes an occupant's perceived strength of association between

him-or herself and specific places" (p. 457). As in place-identity, place dependence was heavily weighted towards cognition, particularly in its use of Thibault and Kelley's (1959) comparison level theory to assess dependence.

It wasn't until Shumaker and Taylor (1983) defined place attachment in terms of the interdependent and system-like nature of the person-in-environment that affect, cognition, and behaviour received approximately equal emphasis in the place attachment research. In their words, place attachment included "cognitions of satisfaction and expectations of stability, feelings of positive affect, greater knowledge of the locale, and behaviors that serve to maintain or enhance the locale" (Shumaker & Taylor, 1983, p. 237). While this definition is general enough to cover a broad spectrum of types of environments, it should be noted that the bulk of the research that has been conducted in the area has centered on attachment to homes, neighbourhoods and similar residential environments (Altman & Werner, 1986; Cuba and Hummon, 1993; Gerson et al., 1977).

Like Shumaker and Taylor (1983), Low and Altman (1992) note that place attachment includes affect as a central part of the construct. This affective component is most evident in the "bonding" process, a dynamic interaction between person and place that is remarkably similar to the bonding that occurs in interpersonal attachment. In their emphasis of this process, Low and Altman explicitly include time as an integral aspect of the place attachment construct. It should be noted that, although this was certainly not the first time that a temporal component had been included in a place attachment model (see, e.g., Stokols & Shumaker, 1981), it was the first instance where the temporal component received consideration equal to affective, cognitive, and behavioural factors.

In a more general sense, the need to consider time as a factor has been stressed in numerous recent articles and chapters on environmental psychology theory and methodology. More specifically and pertinent to this dissertation, time has been cited as a necessary consideration in research involving isolated and confined groups (Smith, 1969; Wilkins, 1973).

While a number of areas in environmental psychology are now moving to include a temporal factor in their research (Altman & Rogoff, 1987; Little, 1983; Michelson, 1987; Wicker, 1987), a body of literature already exists that attests to its influence on place attachment. It is a well-established finding that interruption of long-duration residency, through forced relocation or disaster, can elicit profound emotional reactions (Brett, 1980; Brown & Perkins, 1992; Erickson, 1976; Fried, 1963; Parker, 1975) that bear a strong resemblance to a "grief syndrome" (Shumaker & Taylor, 1983).

Unfortunately, despite the effort to draw together a diverse body of literature on place attachment, the chapters collected in Altman and Low (1992) offer little in the way of clues as to how or where we should proceed with either theory generation or empirical research. The volume covers an exceptionally broad group of disciplines, each with its own traditional theoretical perspectives and research methodologies. This leaves us with a set of theories and findings that are made confusing because they lack a common theoretical viewpoint, methodology, or (so it would seem at times) even agreement on what constitutes the phenomenon under study, despite the claim made by Altman and Low that place attachment is an integrating concept.

In order to conduct a meaningful research dialogue with other disciplines, what is required is an overarching construct that is shared by all the social sciences; in essence, we need a "common language". This construct would need to be more broadly metaphoric than specific and analogous, as specification of a particular research program or a tightly focused set of definitions may not include research foci covered by all disciplines. However, there can be no doubt that the stipulation of this metaphor would greatly foster interdisciplinary communication and serve as a basis to suggest, organize and compare empirical work.

Such a metaphor suggests itself when we note the fundamental characteristics of place attachment. In an examination of the literature, we have seen that the theoretical structure of the phenomenon is characterized by a number of elements:

- 1) affective tone, potentially extreme and encompassing both negative and positive valence (Brown & Perkins, 1992; Low & Altman, 1992; Tuan, 1974),
- 2) a sense of personal involvement and interdependence (Cochrane, 1987; Shumaker & Taylor, 1983),
- 3) knowledge of the place (Shumaker & Taylor, 1983),
- 4) behaviours that imply stability and commitment to the place (Brown & Perkins, 1992; Fischer et al, 1977; Gerson et al., 1977); and
- 5) a temporal component (Low & Altman, 1992; Rivlin, 1987; Stokols & Shumaker, 1981).

These exact characteristics may also be used to describe interpersonal, romantic relationships, a research domain that is common to the three social sciences currently concerned with place attachment (sociology, anthropology, and psychology). Given this striking similarity, the possibility arises that such relationships may provide the theoretical metaphor that would serve to guide research in environmental relationships. It is suggested here that we look to established theory in research on close, interpersonal relationships to guide us in our investigations of person-environment relationships.

With this in mind, I shall move now to a review of some specific models of love and similar close relationships to evaluate their applicability to the problem at hand.

Theories of Close, Interpersonal Relationships

Psychological phenomena can be viewed as a combination of both *structure* and *process*. The first section of this review will examine theories that deal with the static components of love and romance, focusing specifically on a model recently proposed by Sternberg (1987); the second section will deal with the dynamics of close relationship development, examining several models that have been postulated during the last two decades.

This integration, a new approach to understanding place attachment, will then be applied to the phenomenon of *environmental relationships*. It shall be shown how the structural and developmental approaches to close, interpersonal relationships may each add to an

understanding of place attachment in general and to person-environment relationships in polar regions in particular. The review will conclude by suggesting three specific hypotheses that follow from the theoretical literature.

Structural Theories of Close Relationships

When building a structural model, the usual methodology employed in relationship research is to list a number of types of relationships and have subjects rate them, either on rationally derived a priori dimensions or on characteristics that the subjects themselves supply. Several researchers have conducted such work in the last twenty years.

Wish, Deutsch, and Kaplan (1976) asked subjects to rate personal and archetypal relationships on a number of scales. These researchers uncovered four dimensions to relationships: cooperative/friendly, degree of equality, degree of intensity, and socioemotional/informal versus task-oriented/formal. Using a similar method, Forgas and Dobosz (1980) reported that only three dimensions, desirability, sexual versus platonic, and love and commitment, were needed to classify relationships. Adopting a three dimensional approach as well, Marwell and Hage (1970) showed that intimacy, visibility (public/private), and the degree to which interactions are regulated accounted for the differences among role relationships. Finally, the dimensions underlying developmental models (see below), and in particular the stage models of relationships, are characterized by increasing or decreasing intimacy, emotional involvement and display, and/or commitment to the partner.

None of these models has received much attention in the research literature, and so it is difficult to assess their comparative worths on empirical grounds. Attempting a theoretical integration, we see these researchers converge on the broad but classic triad of psychology: *affect* (e.g., happiness, satisfaction, worry), *cognition* (evaluations of the equality, intensity, desirability, and purpose of the relationship), and *behaviour* (regulation of sexual and non-sexual activity, cooperation, and commitment). Such a convergence is interesting but of little use in helping us develop specific hypotheses about the nature of interpersonal relationships.

An alternative empirical approach, using personal construct methodology, has uncovered several distinct dimensions. *Diversity, frequency, strength, and duration* (Berscheid & Peplau, 1983; Berscheid, Snyder, & Omoto, 1989b; Kelley et al., 1983) have all been theorized to predict relationship satisfaction. These four dimensions seem to have an intrinsic appeal to researchers: They are relatively easy to quantify; they are less abstract than those proposed by others; and they lend themselves well to operational definitions. The main stumbling block of the dimensions is their lack of an affective component. Where is the emotion in such measures? Considering the fact that such affectively-laden terms as "loving" or "hateful" can be used to describe close relationships, this question becomes quite pertinent.

Sternberg's Structural Model of Love:

In early work, Rubin (1973) split positive interpersonal relationships into liking and loving, suggesting that attachment, intimacy, and concern about the other's welfare were the basic components of love, while affection and respect were the dimensions underlying liking. Like Rubin, Sternberg (1986, 1988b) has suggested that love can be represented by three dimensions. However, he differs from Rubin in that he includes liking, or friendship, as a form of love (Sternberg, 1988a), making this a more parsimonious model of close relationships. Sternberg's representation of love is the most recent to come forward, is certainly the most detailed thus far, and is built upon extensive theoretical review and empirical work (Sternberg, 1988b, 1991; Sternberg & Grajek, 1984). For these reasons, it was decided to examine his model in depth.

The foundation of the model is that the structure of love resembles the Thomsonian structure of intelligence, i.e., a single construct arising from the bonds between several elements. As Sternberg states,

In this model, love may be thought of as a set of feelings, thoughts, and desires that, when experienced together, yield the composite experience we label love.

According to this view, though, love is not unitary; rather, it can be decomposed

into a large number of underlying bonds that tend to occur in certain close relationships, and that in combination result in the feeling of love. (p. 7)

In other words, love is not a single undifferentiable feeling, and it is not several distinct types of feelings [as in Rubin's (1973) "liking" and "loving"], but is instead a single feeling that has a number of integral components.

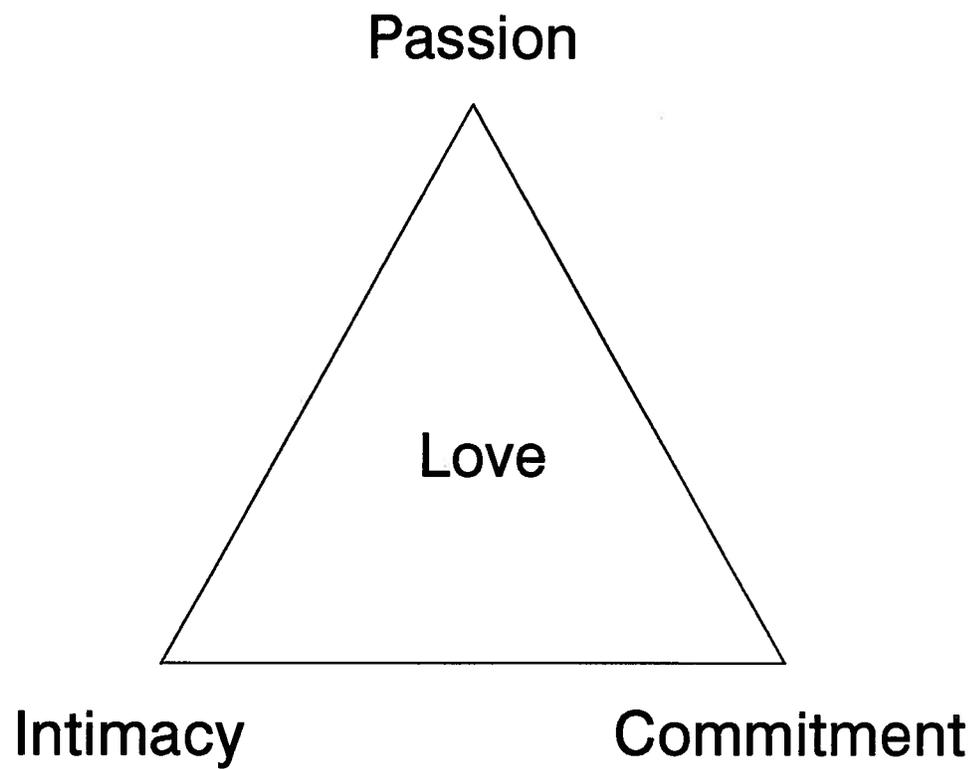
This structure was arrived at through statistical analysis of questionnaire data collected by Sternberg and Grajek (1984). The results of a factor analysis of this data suggested that there was a single strong common element to a wide variety of types of love (friends, relatives, lovers, etc.). Cluster analysis of the same data yielded several clearly separable aspects of this single factor, none of which was sufficient on its own to generate the feeling of love.

Sternberg postulates a three-dimensional configuration with respect to these components, a structure that he describes as a triangular model (see Figure 1). The first "vertex" of this triangle (note that order in which the vertices are numbered is simply nominal) is *passion*: this is the "expression of desires and needs" (Sternberg, 1988a; p. 42). In interpersonal relationships, passion may take the form of physical attraction, a desire for friendship, for romance, and for sexual consummation. Less obvious examples of passion are motivations involving nurturance, dominance, and self-esteem needs.

The second vertex is *intimacy*. Intimacy, in this model, subsumes connectedness, bonding, and closeness (cf. Waring, 1985). It is characterized by a number of different psychological elements: care and promotion of the other's welfare, mutual understanding and emotional support, respect for the loved one, sharing of self and property, trust (particularly in times of need), and deep, honest communication with the loved one.

Finally, the third vertex is one Sternberg has labeled *decision/commitment*; this descriptor is closest to rationality, judgment, or cold cognition. Decision seems to be a simple matter of answering the question "Do I wish to pursue or continue this relationship?" Commitment, to a large extent, is defined by the conditions and personal cost one is willing to

Figure 1. The Triangular Structure of Love
(after Sternberg, 1988a)



experience before choosing to leave the relationship; this aspect of the dimension thus bears a strong resemblance to Thibaut and Kelley's (1959) comparison level theory.

Sternberg has several reasons for suggesting this particular three-factor model. He suggests that these vertices are an optimal solution when attempting to find a compromise between the need to cover the large number of characteristics of love studied by researchers and the need to have a manageable number of factors. The three dimensions, Sternberg argues, are not as temporally- or culturally-specific as many proposed in the literature and, unlike others, are logically distinct concepts. Finally, other models of love found in the research literature may be reduced to the triangular model.

Some considerations of Sternberg's Triangle of Love:

In discussing the nature of the relationship among the vertices, Sternberg (1988a) states that

"the three components do appear to be distinct, although, of course, they are related. You can have any one without either or both of the others" (p. 38).

Passion, intimacy, and commitment are considered aspects of love. It is unclear in any of the expositions of the triangular model to what degree the vertices are meaningfully or statistically separable. If they are related, then they must be considered partially dependent upon one another. On the other hand, the taxonomy of types of love that is proposed by Sternberg seems to rely on the complete independence of the dimensions, although he retreats from this position by stating that the types are idealized and in practice there will always be at least a small amount of each of the dimensions. Indeed, in defining love as composed of passion, intimacy, and commitment, Sternberg implies that love cannot exist, for example, as completely passionless or without some level of intimacy. Others have disagreed (see, e.g., Kelley, 1983).

Empirical work investigating the triangular theory of love has been scanty; this is probably because the theory itself is quite new. The few studies that have been conducted suggest that Sternberg's model may suffer from an interdependence of factors (Acker & Davis,

1992; Chojnacki & Walsh, 1990), and there may be construct validity problems with the intimacy factor (Acker & Davis, 1992). Both these criticisms stem from research using the Sternberg Triangular Love Scale (STLS) and thus may be more indicative of psychometric problems with the scale than theoretical difficulties with the nomothetic structure.

While Sternberg's theory has a number of strong points, perhaps its major shortcoming is its completely positive outlook, i.e., the theory deals only with the presence or absence of love and not with its opposite. Sternberg's three scales, based on his theory, each range from 0 to 9. By changing the scales so that the center point is zero (i.e., each scale ranges from -4 to +4), a conceptual shift is achieved: Consummate love must have an opposite and these expanded vertices should be able to measure its existence.

This relationship would be characterized by the antonyms of the three vertex labels proposed by Sternberg. Such a relationship is not easily described in a single word. The term most often used to describe love's opposite is "hate" (or, perhaps more accurately, "hatred"). There is a burgeoning literature in this area, the bulk of which addresses concerns of psychoanalytic theory and therapy (see, e.g., Bollas, 1984; Gabbard, 1993; Lipschitz, 1986) and seems to be of limited use in generating testable hypotheses. In the few empirical studies that have been conducted, love and hate are simply posited to be bipolar opposites (McCormick & Kavanagh, 1981) although they tend to be measured as if they were separate constructs (Flett, Boase, McAndrews & Pliner, 1986; Parish, 1988a, 1988b). To date, there has been no empirical test of the hypothesis that love and hate are opposites.

On the other hand, there is one clear theoretical argument, with respect to the current study, against the use of the terms "hate" or "hatred": If we are to stipulate that consummate love is comprised of the full positive measure of Sternberg's three dimensions, then the opposite of love cannot include any positive measure of any of the three dimensions. Hatred is thus disqualified simply because it can easily be argued that it, at least on occasion, is charged with passion. This is not to say that love and hate are similar constructs or can exist simultaneously (although this latter argument seems to be made in some of the psychoanalytic literature on

ambivalence; see, e.g., Benedek, 1977) but rather that love and hatred may share some dimensional overlap in their structures.

After much reflection, research into the scientific literature and discussion regarding the nature of the vertices, it was decided that no single term could summarize the structure of love's opposite, at least as love is hypothesized to exist by Sternberg. Therefore, the antonyms of the three dimensional labels will have to suffice as the most efficient descriptors of this type of relationship. This leaves us with the following three dimensions:

Passionate - Cold

Intimate - Distant

Committed - Indifferent

In retrospect, I can think of nothing that would portray the opposite of love better than a feeling of cold, distant indifference.

Process Models of Interpersonal Relationships

While a number of theorists have proposed static single- and multiple-dimensional structural models of ongoing close relationships, relatively few have dealt with the course of such relationships across time (Berscheid, 1987). As Duck and his colleagues have pointed out (Duck, 1983; Duck & Sants, 1983), the dynamic nature of personal relationships makes time a necessary consideration in any model. Put another way,

it does us little good to know that relationships are in flux, developing, declining, or staying at a stable level (whatever that actually means) because as human beings and investigators we find it easier and more satisfying psychologically to represent them as essentially static or state-like (Duck & Pond, 1989, p. 20).

Murstein (1988), in an extensive review of the theories of love, has suggested that the developmental sequence of close relationships can be most parsimoniously summarized in three stages: passionate, romantic, and conjugal (or companionate). The passionate and conjugal stages closely approximate those outlined by Walster and Walster (1978; see below); the

romantic stage is an intermediary step wherein the activity of the partner or partners is "often more focused on idealization of the other than on mainly the sexuality of the other" (p. 29).

Walster and Walster (1978) have proposed the most elegant model of love relationship development. These researchers claim that long-term love relationships pass through an initial passionate stage, then move on to a less passionate but more stable companionate stage. The passionate stage is one of high physiological arousal; it is emotionally intense and often short-lived. The companionate stage, on the other hand, is less intense, at least overtly so, and the stage is quite durable and long-lasting. Physiological arousal is generally lower at this stage (Hatfield, 1988). Recent comments by Hatfield (1988) have hinted that the two components of the model are not necessarily mutually exclusive: A combination of the ecstasy of passion and the stability of companionship is possible, although she points out that "this, of course, takes some doing" (p. 207).

Investigation touching on the temporal details of the passionate-companionate model have led to a confusing set of results. The implication of the original theory was that companionate love came with a certain level of maturity in the relationship. Hatfield and her colleagues (Hatfield, Traupmann, & Sprecher, 1984) have found evidence that passionate love can persist in older relationships, although this seems to be more the case for men than women. This difference in the sexes with respect to the decline of passion was echoed by Acker and Davis (1992), although others have indicated that, regardless of their sex, older persons (aged 65 to 75 years) who are actively dating place more emphasis on the companionate aspects of the relationship. In a study involving a younger group of subjects, Silliman and Schumm (1989) found that university students may have an awareness of the nature of, and the prerequisites for, a companionate-style of relationship. Similarly, Johnson, Huston, Gaines, and Levinger (1992) found that new marriages (less than two years old) fell into four types, one of which was "companionate". It would seem that companionate love does not require a protracted number of years to develop, nor does the fact that a relationship is old guarantee that passion has met its

death. This bodes well for new romantic partners and should certainly cheer those of us in long-term relationships.

Levinger (1979, 1983), building on earlier work on stages of pair relatedness (Levinger & Snoek, 1972), has outlined a model of the development of close relationships. In it, he describes five potential stages. The model is based partially upon the dimensions of interdependence theory (see Kelley et al, 1983), namely the diversity and frequency of interactive (between partners) behaviours, the duration of the relationship, and the strength of influence of the partners' behaviours. It also includes the elements of trust and communication, and the dimension of affective valence. Thus, while the theory is primarily behaviour-based, it tries to incorporate affective and cognitive aspects.

The first stage is *acquaintanceship*, wherein the couple will simply become aware of each other. There may be the beginnings of passion, but this stage is more accurately characterized as a heightened sense of awareness and interest and in this manner is similar to Levinger and Snoek's (1972) surface awareness stage. The second stage, *buildup*, Levinger describes as "an exploration of the extent of the partners' mutual facilitation or interference, their pleasures and problems with each other" (p. 321). In the early portion of this stage, the relationship is not a major focus in the partners' lives; later, it can become central, particularly if it is of a romantic nature and passion begins to increase. *Consolidation* is a period of relative stability and can continue indefinitely. In its content and appearance, consolidation strongly resembles the companionate stage defined by Walster and Walster (1978). *Deterioration*, the fourth stage, is characterized by a weakening of the interconnections, while the *ending* is, of course, the sundering of those connections, either through natural causes (such as death) or through conscious action by one or both of the partners.

While Levinger's "A-E" (acquaintanceship to ending) model is by far the most detailed of the close relationship models that deal with time, the literature to date is marked by a paucity of empirical studies. Much has been said; little has been done. The reasons for this state of affairs are unclear. It is possible that longitudinal research, the style best suited to evaluating the A-E

model, is a bit daunting to researchers. It may also be the case that the model is so new that insufficient time has passed for publications to surface. At the time of writing, however, the model has been out for some ten years; the normal submission-to-publication time lag would not account for such a lack of research.

Sternberg (1988a) has recognized that his structural model does not address, at least to any great extent, the process component of relationships. While this is not a problem for his theory (it was meant only to address the structure of love, not its dynamics), it is obvious that the various dimensions may change over time in both absolute and relative quantity. In attempting to incorporate time into this theory, Sternberg has divided relationships into two very broad categories: short-term and long-term. He has hypothesized that passion is highly important in short-term relationships, intimacy slightly less so, and commitment hardly a concern at all. In contrast, long-term relationships typically hold commitment and intimacy to be very important, while passion is a distant third.

In summary, models that describe love relationships across time hold in common a description of the growth and decline of passion; this feature is generally agreed to be at its most salient and strongest in the earliest stages of the relationship. It is also the feature that is most volatile, being the quickest to grow and the first to decline. Aspects such as security, intimacy, and commitment, on the other hand, show slower growth but tend to be more stable. This is not surprising: these aspects, particularly intimacy, require a fairly extensive basis of knowledge regarding the relationship partner (Altman & Taylor, 1973). Such a base of reference necessarily requires time to grow. As Hatfield (1988) has stated, "both partners know in their bones that they will be able to make a thousand mistakes and the relationship will still hold together" (p. 207).

We see, then, that early stages of close, romantic relationships may be characterized as high in passion and relatively lower in intimacy and commitment; these latter two aspects are strongest in the later stages, when the storms of early passion have subsided.

The "Environmental Relationship"

The subject matter of this dissertation is the structure of the environmental relationship; more specifically, it is the structure of the relationship between present-day, circumpolar sojourners and the polar regions. To the best of this author's knowledge, *environmental relationship* is a new term in the field of psychology and, therefore, a definition is in order. The environmental relationship is

an association that is perceived to exist between a place and a human being.

This association persists across time and is marked by the continuing behavioural, cognitive, and affective attachment a person feels to a given place.

While relatively succinct, this is a simple outline of a research area; a number of further explanatory notes are required to better understand its breadth and limits. First, the term *association*, as it is used here, is a percept experienced by the individual involved in the relationship and denotes a subjective sense of interdependence between the person and place. Unlike interpersonal relationships, a fully interactive element is not an integral or necessary part of the person-environment relationship, although environmental "intentionality" may be perceived to exist by the individual and thus the relationship may be felt to be interactive. Second, the concept of *attachment* is similar to the term used by developmental theorists (see, e.g., Bartholomew & Horowitz, 1991; Birtchnell, 1987; Bowlby, 1978; Johnson & Fein, 1991; West, Sheldon, & Reiffer, 1987). Thus, positive place attachment can be said to have occurred when the place is linked with a sense of personal security, when it is associated with feelings of pleasure, when the person's self-identity is linked to the place, when the person manifests a desire to be in or near the place, and when behaviours are undertaken by the individual that maintain or improve the place. Finally, the attachment to a place must persist over time.

The definition of the environmental relationship incorporates all aspects of place attachment as described above. It differs from place attachment in only one very fundamental sense: the environmental relationship is conceived as being similar in many respects to the

interpersonal relationship. It thus takes as its prototypical example the closest possible interpersonal relationship: love.

As stated above, the research that follows will investigate the *structure* of the polar environmental relationship and the potential changes, if any, in that structure over time. This focus on structure is adopted because, in a new phenomenon, it is desirable to offer as substantial and concrete a description of the phenomenon as is practicable before moving on to its subtleties. In order to keep the study manageable both in time and funding (always a difficult chore in field work), antecedents and consequences of the relationship will not be included as elements of this early research. Thus, queries involving the type of person that seeks a place, the reasons a person is attracted to a specific place, the complementarity of personality and place, and the effects of person-environment mismatch, will be left to future research.

Similarly, the question of a taxonomy of environmental relationships will be held in abeyance for the time being. While typologies generated by the combination of the three dimensions may be useful as informal classification schemes or "thumbnail sketches", it has been shown elsewhere (Berscheid, Snyder, & Omoto, 1989a; Duck & Pond, 1989; Duck & Sants, 1983; Snyder & Ickes, 1985) that relying on attributes and attribute constellations is problematic in relationship research. This is particularly the case when attempting to predict relationship outcomes. The eight types of love generated by Sternberg's dimensions will not be addressed to any great degree in this early work on environmental relationships. Instead, the typologies will be retained only as potential classifications should the dimensions prove to be independent and useful on their own.

Application of Close, Interpersonal Relationship Theory to Environmental Relationships

Having surveyed the literature on place attachment and interpersonal love relationships, it is now time to turn to the manner in which these approaches may be integrated. The following discussion begins with a single model (Sternberg's triangle theory of love), using it as a starting point for looking at the structure of the environmental relationship.

Sternberg's Three Dimensions and Environmental Relationships:

Sternberg's model has several characteristics that make it the most desirable interpersonal model to be used as a starting point for the investigation of environmental relationships. First, it is one of the most recent of the theories to be forwarded and, as such, has had the benefit of the sum of empirical work on the topic. Second, Sternberg has successfully integrated in his model much of the theoretical musing that has taken place in the last twenty years. Finally, the triangular theory of love is one of the few theories that begins as explicitly structural but still allows for the investigation of the influence of time. Its specific mention of short- and long-term relationships makes it particularly applicable to cross-sectional research into the development of the polar environmental relationship (see below).

The translation of a theory from one domain to another is a tricky undertaking. The main pitfalls lie in the redefinition of key terms and the specification of the relationship between those terms. In Sternberg's model, this latter problem has been solved inasmuch as the three key dimensions (passion, intimacy, and commitment) are supposed to be orthogonal to each other. The general redefinition of the three dimensions in environment-orientated terminology follows.

Passion for place:

In environmental relationships, passion may manifest itself as love for the adventurous nature of a place, a visible excitement or expressed longing for a place. High environmental passion is, at its core, a heightened arousal (primarily affective, but expressed behaviourally) that is directly associated with a place. This arousal is usually expressed as a physical excitement, but it can also take the form of a more "spiritual" revelation: e.g., a person who is passionate about a place might feel a profound sense of wonder while on location. Observable actions indicative of passion for a place include: enthusiastic comments about "loving" or "liking" the area; expressed feelings about the romance of adventure; and comments about the spiritual characteristics, or the spiritual impact, that a place holds. Note that the opposite of passion is a cooling off or outright coldness towards the place: this means that the person expresses such

sentiments as boredom, lack of interest or enthusiasm, and a pronounced lack of reaction when asked about their feelings towards a place.

Place intimacy:

Intimacy is characterized by a number of different elements: care, maintenance, improvement and promotion of the environment, knowledge of the physical environment, the skills and knowledge necessary to interact successfully with the place, and a recognition or expressed feeling of interdependence with the place (a belief that the respondent and place are somehow tied together, that the place forms part of the person's self-identity and, possibly, that there is a "spiritual" connection). In interpersonal relationships, intimacy can be described as an opening up of two people to one another. It goes beyond the simple act of mutual self-disclosure and can be scored as the depth of knowledge each partner has of the other. The translation of interpersonal intimacy to environmental intimacy is difficult until one examines Sternberg's defining terms for intimacy: closeness, bond, and connectedness. Environmental intimacy is the degree of active involvement with a place. Involvement, in this case, includes both overt behaviour or covert thoughts; it also includes the knowledge gained by the respondent through his or her exploration of, passage through, or manipulation of, the environment. This last point stresses the difference between actual experience with a place and simply thinking, reading, or dreaming about it. While these cognitive activities may be undertaken by those who do not travel to a place as well as those who do make the trip, first-hand experience is fundamentally different from second-hand reports, no matter how accurate, descriptive, or clear those reports may be. There are few who would argue that imagining what love must be like is the same as being in love.

Commitment to a place:

In its simplest form, commitment to a place is quite straightforward: high commitment occurs when a person elects to stay in a place despite costs (financial, psychological, physical, or otherwise) to that person. Certainty about one's desire to remain on-site, effort expended in order to "stay put", and returning to a place several times by choice are all examples of

behaviours associated with high commitment. A point to remember about this vertex is that it has two components: the immediate decision to like or love; and the prolonged action and intention of staying in the place.

Examples of commitment to a place abound. In recent times, environmentalists have urged people to "adopt" specific locations or ecosystems, in much the same manner that one may help a poverty-stricken child in another country by supporting that child through a charitable agency. While the utility and wisdom of this approach are open to debate, it certainly serves as an example of commitment to an area's well-being. In a more common scenario, one of the strongest forms of commitment occurs when one settles into a neighbourhood. The strength of this commitment is most obvious when we examine the idea of "home": forced relocation of residents during urban renewal projects is often very upsetting to the residents, engendering what amounts to severe grief (Fried, 1963; Holohan & Wandersman, 1987) and motivations to recover one's home (Tognoli, 1987). While grief and motivation are aspects of intimacy and passion, the behavioural manifestations (from petitions to civil disobedience) that occur as a result of the grief and motivation clearly belong to the category of commitment.

Process Models and Environmental Relationships:

While the Levinger (1983), Murstein (1988), and Walster and Walster (1978) models differ with respect to the number and names of the stages, it is clear that they share at least one point in common. All of these models suggest that arousal and instability will characterize the early portion of the relationship but that this will eventually "level off" at some point, given that the relationship endures for a sufficient length of time. Later stages of the relationship will be marked by affective stability, an increased sense of familiarity, and commitment to the relationship.

The transposition of this pattern to environmental relationships is fairly clear. People new to a place are likely to be in an aroused emotional state upon moving to a new place. Such arousal, depending on how the person chooses to interpret the state, may manifest itself as enthusiasm and happiness or, on the negative side, trepidation, fear, and hatred for the place. It

is likely that a person who is new to an area will show less caring than a long-time resident; certainly he or she will exhibit less knowledge about the place. The new resident is more likely to "pick up and move on", whereas longer-term inhabitants will generally exhibit a resistance to changing locations.

Environmental Relationships and the Polar Regions

Why the Ends of the Earth?

There are a number of reasons for choosing the polar regions as the setting for this research. First, the polar region can be considered a "natural laboratory" (Gunderson, 1973; Suedfeld, Bernaldez, & Stossel, 1989) in light of its relative isolation from the highly populated temperate zones and, beyond that, the isolated and confined nature of the individual work locations in the Arctic and Antarctic. As has been pointed out elsewhere (Suedfeld, 1991), the "laboratory" is, of course, more metaphorical than real, but the fact remains that the circumpolar regions are two of the few places in the world where a psychologist can observe an *in situ* group while minimizing the likelihood of external variables unexpectedly (or, worse, invisibly) intruding into the observation situation. In some instances, one can, for all practical intents and purposes, control almost all linkages to the "outside" (Steel & Suedfeld, 1991, 1993). In smaller groups and with more than one observer, it may be possible to record every action pertinent to the construct under study, thus ensuring a degree of internal validity much wished for in field research.

Second, it was noted as early as the beginning of this century that the polar regions offer psychological researchers much in the way of interesting population demographics (Priestly, 1921). This is particularly true of Arctic and Antarctic sojourners: they come from several different nationalities and cultures, are employed in a wide variety of occupations, and all reside in the same unusual environment for varying periods of time. In addition, many of these sojourners are first-time visitors to the region and therefore studies of the growth and decline of various psychological phenomena can be carried out.

A third reason for choosing the polar regions as study sites has to do specifically with the study of environmental relationships. By comparison, it requires far less effort to gain entry to

most other environments; such hurdles as selection procedures, money, time, and several similar impediments must be overcome before the sojourner can travel to the polar regions. In few other places does access require such an active expression of choice. People do not end up in the area by mere whim, accident, or chance; rather, their presence is the result of concerted, often prolonged, effort and forethought. Thus, the polar sojourner implicitly demonstrates that, for one reason or another, the region is very attractive.

The fourth reason is perhaps the most fundamental as to why one studies the polar sojourner. For most of these people, the circumpolar areas themselves are *extreme and unusual* (Suedfeld, 1987). In Suedfeld's words, extremeness is defined as the "presence of physical characteristics related to danger and discomfort" (p. 864) while unusualness refers to "the novelty of the environment" (p. 864). The areas are extreme primarily in their physical features (very cold temperatures, high winds, unusual light cycles, etc.). These are conditions that are well beyond the parameters normally found in the more temperate zones, particularly when considered in combination. Without proper support and equipment, such conditions would quickly become life-threatening. These features are enough to make the regions unusual as well, inasmuch as they are not regularly experienced by most polar sojourners as part of their lives "back home" (although the degree to which the areas are unusual becomes less as one turns to that rather small but nonetheless interesting group of people, the professional isolates). In addition, the regions are unusual in the abnormal social conditions of remoteness, isolation, and long-term confinement with an unchanging group of people that are hallmarks of most polar camps and stations.

The challenges inherent in the natural environment suggest that the personal attraction the region holds must be strong for one to elect to go there; this is particularly so in the case of sojourners who might return even after experiencing the full range of unpleasant conditions. The extremity of the setting may also bring about powerful feelings, both negative and positive in valence. This latter point ranks among the most persuasive reasons for choosing the polar regions as study locations for environmental relationships. Given the extreme conditions of the

areas, it is likely that one will find a significant number of cases where the region is truly disliked; on the other hand, the anecdotal literature suggests that highly positive relationships will also be found. Thus, it is arguable that the variability necessary for the test of a theory would be present in the region's sojourner population. Less extreme environments do not seem to hold out as much promise for such a wide range of environmental relationships.

There is certainly ample evidence in the popular literature that strong forms of attachment to polar sites develop as a result of traveling through the regions. The interested reader is referred to any of the numerous expedition accounts, both recent and historic, but particularly to those of Byrd (1938), Lopez, (1986), Ponting (1921), Stefansson (1921), and Steger (1987). Ponting, who served as the photographer on Robert Scott's last expedition, gives a rather notable description of the pronounced "interpersonal" nature of the one's relationship to the polar environment.

Whilst this pleasurable season lasted, the stern countenance of Nature relaxed into smiles, and assumed such gentle aspects as seemed almost incredible after the frowns and passions that had marred it for so long. Even our sterile peninsula simulated a comeliness of mien of which I had not suspected it capable... (pp. 194-195)

The final reason for going to the poles is, admittedly, a personal one. My strongest area of interest in psychology has long been the behaviour of people in extreme environments. Before I began my formal studies in psychology, this interest was expressed as a fascination with astronauts, submariners, and explorers. It was with much delight and curiosity that I turned to the high latitudes to conduct my dissertation research.

Passion, Intimacy, Commitment and the Polar Environment

While all three aspects of the Sternberg model may be applied to person-environment relationships in polar regions, two are particularly relevant. First, given two of the most salient characteristics of polar regions, harshness and stark beauty, and the exceptionally strong draw the circumpolar areas have had (both recently and historically) for hardy explorers and

adventurers, it makes intuitive sense to suggest that the regions have some potential for evoking a sense of passion. Furthermore, content analysis of the diaries of polar adventurers has suggested that the mood on an expedition was typical of an aroused state (Mocellin, 1988).

Second, the length of time spent in a polar camp is often very short. Couple this factor with the somewhat forbidding nature of prototypical polar areas, particularly on the Antarctic continent, and one may reasonably wonder how "intimate" one could become with such a place. However, while it is possible that polar sojourners would show low degrees of environmental involvement because conditions bar them from having any in-depth experience in the place, it might also be argued that the extreme conditions impart a depth of intimacy like no other. While not wishing to claim that the Arctic and Antarctic are unrelentingly harsh (I shall leave that up to authors of speculative and sensationalistic fiction), it is true that the experiences afforded one in the polar regions can be quite intense: food, shelter, water, and heat rarely recede to subliminal background concerns, and knowledge about, and concern for, one's surroundings can have a direct impact on one's health and well-being.

Although commitment is perhaps the easiest aspect of Sternberg's triad to apply to environmental relationships, the question of its existence may become moot in research using sojourners who are in an isolated and confined environment: once they are on-site, they are often unable to leave the place by choice and the decision to commit themselves to the environmental relationship may actually be irrelevant. They are, *de facto*, behaviourally committed to the place and therefore must have some sort of relationship with it; therefore, the decision aspect of this vertex is out of the hands of the sojourner. On the other hand, commitment to the polar region can be expressed when one chooses to return to the area; high commitment is shown when the return involves high costs to the individual, such as leaving a loved one "at home" or spending a great deal of money to return. Commitment is also typified by such actions as staying in place when the conditions are unpleasant (given that one has the option of leaving), or extending a summer work contract to cover the winter season.

The Development of Environmental Relationships in Polar Regions

If we assume that environmental relationships resemble interpersonal relationships, then research into polar environmental relationships is at a keen disadvantage when compared to research conducted into interpersonal relationships. Continuing and prolonged environmental relationships are not the normal run of affairs in circumpolar workers and visitors, particularly those in the Antarctic. The majority of sojourners to the polar regions are "once-only" novices, and their stay in the environment is often quite brief (usually less than twelve weeks). Long-timers are even more rare and generally divide up into two types: those who have many short seasons; and those who have a few long seasons (of three months or more). The relative paucity of these long-timers, and the fact that these already low numbers split into two more groups, make the study of the stage analogous to consolidation and commitment difficult.

The existence of these two populations, short- and long-timers, suggests that it would be useful to employ an interpersonal relationship model that already incorporates such groups. The triangular model, of course, has hypotheses dealing specifically with short versus long duration relationships. It is unfortunate that Sternberg does not define exactly what constitutes a short or long term relationship. The relative nature of both terms leaves one in a bit of a quandary. While a marriage of five years may seem long to some single people (and, perhaps, to some married ones), it might be viewed as short by a couple who has passed their twenty-fifth anniversary. A similar problem exists with the duration of environmental relationships, but it is generally accepted by polar sojourners that novices (i.e., people who are in their first Arctic or Antarctic season or people who have had less than six months experience) have a qualitatively different experience from those who are in their second or subsequent season. This is analogous to having one's first brush with romance: it may turn out well or badly, but it is definitely a unique experience.

Hypotheses

The translation of interpersonal relationship theory to the person-environment domain, and specifically to the polar environment, could lead us to an overwhelming number of

hypotheses. As a starting point, this dissertation will focus on three specific and basic propositions.

1. The first proposition is simply that a model of interpersonal love, appropriately modified and expanded to include the negative valence of each of the factors, may be applied to the analysis of environmental relationships. In other words, we will be able to rate others and ourselves along dimensions similar to those applied to interpersonal love. Using the definitions derived from Sternberg's model, this hypothesis is tested by having raters (self or other) make judgments regarding one's passion, intimacy, and commitment to a place. If it is a valid approach, raters should have little or no difficulty making these judgments.
2. If we can establish the applicability of a modified Sternberg model to environmental relationships, a number of research lines open up. Perhaps one of the most interesting and psychometrically fundamental concerns the independence of the three dimensions: Do the dimensions show orthogonality, or are they interrelated? The answer to this question goes to the heart of the model. Sternberg claims that love is a multi-dimensional construct that leads to a variety of "types" of love, but psychometric analysis has shown that the dimensions exhibit at least some construct overlap. If the environmental dimensions show a high degree of overlap, then it is possible that one's relationship with a place is actually a one-dimensional structure.
3. Following Walster and Walster (1978), Hatfield (1988), and Sternberg (1988a), it is possible that long-term environmental relationships pass through an initial passionate stage on the way to a less passionate but more committed, companionate stage. Two distinct sub-populations of the polar sojourners can be used to test this hypothesis using a cross-sectional methodology. "Novices" (first-time visitors who have spent less than one season or six months, whichever is shorter, in the polar regions) should show characteristic differences in their expressed relationship with the polar environment, as compared to the multi-season and experienced "Old-hands". Specifically, novices

should show higher ratings in passion and lower ratings in commitment when compared to old-hands. Intimacy should be generally higher in the old-hands group, if only because of the increased number of opportunities they have to explore the place.

These hypotheses were investigated in two studies that formed a separate component of a much larger, multi-year data collection enterprise, the Polar Psychology Project (Suedfeld, Bernaldez, & Stossel, 1989). The first study used an interview-based methodology; the study was intended to be exploratory and, as such, required the flexibility and breadth of this technique. The experience and information gathered during the initial study led to the development of a self-report scale. This scale was then employed in the second study, and allowed the researcher to focus on specific topics.

STUDY 1: INTERVIEWS OF POLAR SOJOURNERS

Methodology

Rationale

This study investigates the phenomenon of environmental relationships in a field setting. Briefly, it is concerned with the presence and interaction of the environmental equivalents of interpersonal passion, intimacy, and commitment, and how these factors interact with the amount of time a person has spent at a given place.

Several requirements govern the choice of a method. First, of course, is that it must be practical, i.e., it must be a method that can be carried out with some degree of ease in an often remote field setting. Second, as the existence of the environmental relationship can still be considered highly theoretical, a technique is needed that has some flexibility. It must be able to be modified as new insights are made. Third, if one is to conduct research in a number of sites, it would be preferable to utilize a technique that is sensitive to a variety of environmental contexts and to the people inhabiting these sites. At the same time, the method of choice must be sufficiently standardized across administrations to allow some meaningful degree of comparison and contrast.

The first two constraints rule out bulky or fragile packages or difficult-to-modify remote recording hardware. They also relegate lengthy questionnaires and similar pencil-and-paper tools to the "less preferred" category, although the transportation of cumbersome boxes of paper into the most remote of places is not entirely unheard of in polar psychology (Mocellin, 1988; Steel & Suedfeld, 1993). A brief questionnaire or survey, however, was an attractive possibility. The ease with which pencil-and-paper measures may be administered once on site, and the clarity often derived from their analysis, argued in favour of including this type of measure in the study at some point.

There existed one further argument for utilizing such a test. Sternberg's triangular theory of love has a self-report scale already developed to tap the three dimensions of passion, intimacy, and commitment in interpersonal relationships. It might have been possible to modify this scale for the purposes of measuring the environmental relationship.

This approach was abandoned early. The scale items themselves were difficult, if not impossible, to rewrite for environmental relationships while still maintaining a theoretical link to the original item. This threatened the ability of the scale to measure the theoretical structure. A second difficulty presented itself when two studies were published that suggested the construct validity of the original scale itself was suspect (Acker & Davis, 1992; Chojnacki & Walsh, 1990). The former problem could have simply been a lexical challenge, one that could be overcome given enough time and determination; when the latter criticism was added it was enough to preclude the scale's use entirely, particularly given the already "once-removed" nature of the environmental relationship. It was decided, instead, to pursue other techniques in the hope that a self-administered scale could be developed at a later time. This proved to be a useful strategy.

The third constraint upon the methodology, sensitivity versus similarity, suggests a technique that is "semi-structured", allowing the same questions to be posed but not binding the researcher to those questions alone or forcing the respondent's answers into a rigid framework. This degree of responsiveness demands that the researcher be on site and interact personally

with the respondent. Of the in-person techniques, naturalistic observation permits a free response but cannot guarantee the occurrence of the similar categories of behaviours across settings and times. Participant observation facilitates understanding of the environmental context and awareness of alternative explanations not inherent in an a priori model, but it does not tap others' perspectives directly.

It seems, therefore, that the methodological tool most useful for exploring the environmental relationship, at least in the early stages, is a semi-structured interview. This tool has the portability desirable in field settings; it can be modified to the various exigencies of any given place; it has the flexibility that is useful in the beginning stages of research; and it is highly sensitive, in the hands of a good interviewer, to personal nuances of a more general phenomenon. It is also well-suited to capturing the "richness" that typifies emotional relationships (Spradley, 1980; Yin, 1989) while maintaining a level of structure that allows for a degree of standardization across administrations.

Development of the Interview Protocol

Development of the interview protocol took place over several seasons. The focus of the interview was always the environmental relationship, but efficiency required that a number of other phenomena be investigated by "piggy-backing" them on to the core protocol. Following a content analysis of the results from pilot interviews conducted during the summers of 1989 and 1990, in the Canadian High Arctic (see the site descriptions below), it was decided that two questions best tapped the environmental relationship without leading the respondent.

The first of these was an open-ended, stem-like request to "Tell me about [this place]". It had been found that this prompt tended to elicit responses that had to do with people's "liking" or "not liking" the place, the degree of enthusiasm they had for being at the place, and the amount of knowledge and caring they had for the location. The second question was somewhat more focused, but equally simple: "What are your reasons for coming here?" This question primarily tapped commitment-related topics such as job requirements, personal values, and interest.

These two questions were included in every interview across the seven field seasons that followed the pilot seasons.

In order to determine the "stage" of the environmental relationship, the interviewer also questioned the respondents about their personal history with the place so as to determine if the respondent was a "novice" or an "old-hand". This question usually took the form "So, is this your first time here?" If it was not the respondent's first time, they were asked for the number of times they had returned to the site and the length of time they had spent on-site..

Data Collection Sites and Conditions

The literature on the polar environment is peppered with superlatives. For example, the "standard, normal" Antarctic article begins with, or includes prominently later in the text, a descriptive list which includes extremely cold temperatures, high wind speeds, the average altitude of the continent, and the unusual light cycle.

While not denying that these features exist in the circumpolar regions, it should be kept in mind that the majority of Arctic and Antarctic sojourners never experience the full force of the more unpleasant side aspects of the local climate. Most visitors (researchers, support personnel, and tourists) arrive well after the start of the polar spring and leave before the start of the polar autumn. The weather during this time, generally referred to as the "summer-over" period, is typical of what one might find in the temperate zone in early and late winter.

For the most part, summer-over personnel in the Antarctic live in fairly safe and well-constructed permanent or semi-permanent buildings; direct threat of harm from the environment has become less and less with each passing season. Our summer-over respondents in the Canadian Arctic usually lived in tents, if they were part of a research team, or permanent and well-insulated buildings, if they were members of a meteorological outpost. While life is certainly not as pleasant or comfortable as "life back in the real world", the conditions imposed upon summer workers have more of a flavour of inconveniences and constraints upon their behaviour rather than outright threats to their survival.

Winter-over (late fall to early spring) participants in both polar regions, on the other hand, may find themselves working outdoors in the fury of a polar blizzard on any given day during the dark season. Failing to take adequate precautions in something as simple and routine as dressing can mean painful injury or death; fire, or a breakdown in the life support systems in the station, has almost all the ramifications of a disaster in space. This is not to say that the environment is continually harsh or unsafe; many of the respondents went to some length to point out that the conditions during mid-winter actually seemed less stressful than the crowded conditions experienced during the summer. Similar comments can be found in the diaries of polar explorers (Mocellin & Suedfeld, 1991).

Specific Site Information:

Isachsen, NWT, Canada (78°N, 103°W): This was the location of the pilot work for the interview. Isachsen is a decommissioned Atmospheric Environment Services (AES; Canada) weather station. It has the distinction of being the first site in the polar regions dedicated specifically to psychological research. With regards to climate, perhaps the conditions are most picturesquely described by a former researcher at the location: "It's a mudpit with blowing fog." Average temperature while the researcher was on-site: 3°C.

Eureka, NWT, Canada (80°N, 85°W): Eureka is an isolated AES weather station located on Slidre Fiord, Ellesmere Island. It is operational year-round with a personnel contingent of fifteen people, but experiences a dramatic upsurge in activity and population during the summer season as scientists and tourists pass through the area. It is the second-most northerly of all Canadian non-military weather stations and, despite this fact, is noted as having relatively mild weather conditions during its summer season. Informally, it is known as the "Garden Spot" of the High Arctic (average temperature for the period the researcher was on-site was approximately 14°C), and it has the good fortune of being in a very scenic area. When compared to other places in the High Arctic, it has an abundance of flora and fauna (muskoxen, caribou, wolves, foxes, and

the occasional (and very quick) lemming). As with Mould Bay and Resolute (see below), several television channels, a physical fitness room, and a live-in cook are all part of the amenities available to the residents.

Mould Bay, NWT, Canada (76⁰N, 119⁰W): Mould Bay, at the time of the study, was similar to Eureka in terms of population and yearly activity cycle. Unlike Eureka, however, the increase of activity in the summer months is somewhat smaller due, in part, to its inaccessibility and lack of established tourist destinations. The surrounding terrain is primarily low hills, covered in the summer by sparse vegetation. The low grass and lichen are food sources for small caribou herds in the area. The average temperature while the researcher was on-site was approximately 9⁰C.

Resolute, NWT, Canada (74⁰N, 95⁰W): Resolute is the High Arctic base for several federal government agencies and a few private companies. The main logistical support for summer science projects, the Polar Continental Shelf Project, stages its operations from this location. The population number varies but is generally around one hundred support personnel and scientists. The area is serviced by four commercial jet flights per week and is therefore popular with tour operators running programs to more remote sites. An Inuit village exists five kilometres away and is connected to the main staging area by a gravel road. The area itself is not particularly scenic; Cornwallis Island is mainly a series of low-lying hills with little or no vegetation; sightings of wildlife in or around the area is rare. The mean temperatures for the periods the researcher was in Resolute were around 7⁰C.

Remote field sites: It is difficult to give a summary of the fly-in sites; over twenty of these locations were discussed in the interviews, and the researcher was fortunate enough to be able to spend time in four of these camps. Most are reached by a Twin Otter aircraft, and flights can range between one-half and three hours in duration; this equates to a distance of one hundred to six hundred kilometers from base camp. In almost all cases, all shelter (tents), food, and life support gear must be transported in on

one or two flights. An indirect compensation for all this work is that these fly-in sites are usually the most scenic of all Arctic wilderness locales. Given that the locations span over ten degrees of latitude, it is not surprising that temperatures and climactic conditions vary a great deal across the sites.

McMurdo Station (USA)/Scott Base (NZ), Antarctica (77°S, 166°E): These two stations, which are separated by a mere five kilometres, are on the northernmost point of Ross Island. Conditions differ substantially from those of the Canadian High Arctic. The scenery, even in the middle of the austral summer, is dominated by vast expanses of ice. The climate is correspondingly colder; the temperatures for the periods the researcher was on site varied substantially, but were, on average, approximately -5°C to -10°C. The air is rarely still, and high winds occur on a fairly regular basis. The majority of personnel are support staff and are usually on-site for the entire four months of the summer. This summer employment can be extended to include a "winter-over" stay of an additional eight months.

Respondents:

Data from fifty interviews were collected; of these, the first seven were pilot interviews conducted at Isachsen and therefore were not entered into the final analyses. Ten more respondents were dropped for technical or methodological reasons: the recordings from four respondents were so poor in quality (due to background environmental noise or low battery power in the tape recorder due to cold) that they could not be heard clearly, three other respondents had such strong accents (New Zealand) or poor diction that the transcriber was unable to understand clearly what they were saying in a large portion of the interview, and three respondents did not answer both the "Tell me" and "Reasons" questions. No individuals approached for an interview refused to participate, and the demographic variables of those respondents who were dropped did not differ from those included in the analysis.

The mean age of the remaining thirty-three respondents was 34.18 years (SD = 9.44). A breakdown of other respondent characteristics pertinent to this study is given in Table 1.

Table 1. Respondents in Interview Study

	Arctic		Antarctic		Total
	Novice	Old-Hand	Novice	Old-Hand	
Male	2	3	4	9	18
Female	1	2	10	2	15
Total	3	5	14	11	33

Procedure:

Potential respondents were approached by the interviewer and a request was made to participate in the project. This request included general information about the nature of the interview ("It's about your thoughts and feelings about being in the Arctic/Antarctic") and assurances about anonymity and confidentiality. If the person agreed to participate, a time was set for the interview. Quite often, this time was within a few hours after the initial contact.

The interview setting varied from site to site but was always a place that would ensure privacy. Tents, dining areas (well after meal times), offices, and bedrooms were typical of the locations of the conversations.

The interview session began with a standard statement regarding the rights and privileges of subjects in psychological studies (see Appendix 1). Due to the relatively closed nature of the social system in isolated settings, and the possible topics that could arise in the open interview (which often included feelings about the respondent's job, and the state of the relationship between the respondent and his or her colleagues), special emphasis was placed on the confidentiality and anonymity aspects, particularly with respect to their employer or parent organization (e.g., their funding agency).

The interviewer then moved to the first question, "Tell me about [this place]"; this was followed by four or five similarly open-ended questions (e.g., "How do you see conflict being resolved in camp?"), which were related to the topics of interest for that field season. The interview normally ended with the question, "What are your reasons for coming here?" If subjects gave a response indicating some form of extrinsic motivation that was anchored to the

place (e.g., "because this is where the job/study site is"), they were asked if it were not possible to receive the same benefits elsewhere. This procedure was followed in order to check whether the respondent was motivated solely by career advancement or monetary rewards, as opposed to being drawn to the place for experiential or aesthetic reasons.

The interview concluded with a debriefing statement that explained the purpose of the study in greater detail than was given in the introductory statement. The respondent was encouraged to ask questions about the study at this time, and all questions were answered as completely as possible. The respondent was also given the researcher's university address and told that they could write to him there if the respondent had any further inquiries after the researcher left the site.

Results

Data Reduction

A scoring scheme was developed based on the definitions of each vertex in Sternberg (1987, 1988a, 1988b) and modified appropriately to refer to the environment. From these basic definitions, a "Judge's Package" was assembled. This package included a set of instructions to the person rating the interview (the "rater"), core definitions for quick reference, extended definitions, a set of key actions that would be typical of high and low scorers, and examples of high and low scored statements for each vertex (see Appendix 2). The package also contained nine edited (see below) interview transcriptions and scoring sheets (one per interview) with nine-point Likert-style rating scales for each dimension of interest.

Of the nine interviews, five were common to all the packages and four were unique. This allowed the researcher to test for inter-rater reliability while not overtaxing the raters, and thus potentially reducing the accuracy of their scores, with the onerous task of scoring all thirty-three interviews. As it was, the amount of time it took to score the nine interviews was generally reported to be close to two hours.

As may be seen in Appendix 2, the scoring scheme allowed for a score between -4 and +4, where the positive score represented the highest possible rating on the modified Sternberg

vertex and the negative score represented the highest possible score on its nominal opposite. A "can't decide" option was included for each vertex in order to test the hypothesis that the vertices could not be used to score environmental relationships.

The interviews were transcribed and edited so that only the responses to the two questions of interest (see above) were included in the final printed copy. This editing procedure yielded a set of transcripts that varied a great deal in length (mean = 6.7 typed, single-spaced pages, SD = 6 pages), a problem that was of concern given that the technique for quantifying the transcript data relied on rating the content of the interview. It was possible that less content, and thus less overall information, may limit the ability of the raters to score the degree to which each vertex was actually part of the respondent's environmental relationship. It was decided to include a test of this hypothesis in the statistical analysis (see below).

All seven raters were volunteers; five of the raters were third-year undergraduate students, while the other two raters had graduated the previous year. No special training was performed with the raters, save that the researcher was available to answer any questions that may arise. During the time the raters were scoring the interviews, the researcher fielded only two questions that dealt with minor points ("Should the rater read the entire transcript first or score it as s/he went along?" [Answer: Read it all first] and "Can I assign scores in between the whole numbers?" [Answer: No, because it would put them on a different numerical system than the other raters]). It is noteworthy that in a "debriefing" session in which the raters' feedback on the scoring system was sought, none of the raters felt that the concepts were unclear or the criteria used for scoring needed greater precision, except in the case of Intimacy. The raters felt that this facet attempted to capture too much and that it may actually represent more than a single dimension.

There were also some expressions of concern regarding whether the raters should assign ratings based on an overall impression, or rate individual statements and then calculate a mean. It was decided during the raters' debriefing session that what the "overall" raters

performed was an implicit averaging of statements and therefore both approaches would probably lead to similar scores.

Analyses

Concordance Among Raters:

The first analysis to be carried out tested the inter-rater agreement on the three vertices. Three separate Kendall's W s, corrected for tie scores, were calculated using the scores assigned by each of the raters to each of the five common transcripts. Good agreement was found for two of the vertices. Passion and Commitment showed equally good concordances ($\underline{W} = .65$ and $\underline{W} = .61$, respectively; both $p < .01$). Intimacy was the most difficult to agree upon, and showed only minimal agreement ($\underline{W} = .27$, *n.s.*).

Given the comments about the multiple component nature of environmental intimacy garnered during the raters' debriefing, these results were not surprising. The initial conversations with the raters had suggested that they could be separated into two groups with respect to their style of scoring; the next step was to return to the raters and inquire as to the criterion, or criteria, each had used for assessing the Intimacy factor. It was hoped that this inquiry would shed some light on the nature of the two styles, and this indeed turned out to be the case.

The raters stressed one of two specific characteristics of environmental Intimacy. Three of the raters tended to emphasize caring for or about the environment, whereas three other raters tended to assign a score based on the respondent's depth of knowledge. One rater used both criteria but attempted to amalgamate the separate sub-factors.

Despite the different scoring styles for Intimacy, it was decided to follow the original model and continue to use the full data set for the next series of analyses, but to exercise caution in interpreting any results pertaining specifically to the Intimacy factor. The data matrix for the next set of analyses is comprised of the following: for each respondent whose vertex scores were rated by multiple raters (i.e., the five common respondents), each vertex score is an average of the seven raters' separate ratings; for each of the twenty-eight respondents who were rated solely by one rater, the vertex ratings were entered as they were scored by the rater.

Sex Differences:

An unusual aspect of the sample demanded that a preliminary analysis be conducted. As can be seen in Table 1 above, forty-five percent of the sample were women. This is not in line with the normal female-to-male ratio in polar camps or stations; at any given place, the percentage of women one would currently expect to find is between ten and thirty percent. Sites with a greater proportion than thirty percent are fairly uncommon and, although a sex difference in the three components was not part of this study's original hypotheses, it was felt that such an analysis was necessary in order to explore this potential influence on further analyses.

A Hotelling's \mathbb{I}^2 analysis was conducted using sex of the respondent as the independent variable and Passion, Intimacy, and Commitment as the dependent measures. Results of this analysis indicated that there were no significant differences between the sexes on the three components [$\mathbb{I}^2=6.68$, $F(3,29) = 2.08$, *n.s.*].

Polar Differences:

The sample used in this study was composed of a mixture of Arctic and Antarctic personnel. This would have made it unusual enough in polar research, but a further consideration was that the proportion of respondents from the two poles was unequal: approximately 75% of the people interviewed were Antarctic sojourners. This proportion, although probably not far from reflecting the reality of the two poles' contributions to the overall polar population (no firm numbers exist comparing the two poles), was lop-sided enough to warrant a separate analysis.

As in the sex difference analysis, a Hotelling's \mathbb{I}^2 analysis using the Passion, Intimacy, and Commitment ratings revealed no significant differences between the two polar groups [$\mathbb{I}^2 = 2.08$, $F(3,29) = .95$, *n.s.*].

Independence of the Vertices:

The basic supposition behind Sternberg's triangular theory of love is that close personal relationships are not unidimensional structures but instead are comprised of three separate and orthogonal components. As mentioned earlier, the independence of the original components has

been called into question, and so it was felt that the orthogonality of the modified dimensions tested in this study needed to be examined. In addition, because there was the danger that scale scores may be affected by the amount of available material from each respondent, a correlation was derived between each scale score and the respondent's file size (in bytes).

The results of these analyses are given in the intercorrelation matrix shown in Table 2.

Table 2. Correlations of Passion, Intimacy, Commitment and Length of Interview

	Passion	Intimacy	Commitment
Intimacy	.67**		
Commitment	.61**	.87**	
Interview length	.09	.30	.23

The correlations shown in this table clearly indicate that Passion, Intimacy, and Commitment, as assessed by the raters, are not orthogonal. Thus, the environmental relationship may be a single structure. The amount of material available to the rater seems to have little influence on the rater's scoring of the interview on any of the dimensions. The highest correlation with file size, that of Intimacy, indicates that only 9% of the variance was explained by the length of the material being scored.

The nonorthogonality of the factors has some implications for follow-up analyses. If we assume from this statistical analysis that there is a structural overlap at the theoretical level, then the proper path to follow would be to aggregate the facet scores and conduct the analyses using these new data. The difficulty with this approach is that not one of the raters felt that the definitions of the facets overlapped, which suggests that there may be sufficient differences between the factors to warrant treating them as separate but strongly related components. Simply stated, the raters felt that the dimensions had strong and independent face validity. Besides, one of the main intentions of this research project was to examine the applicability of the modified Sternberg model to environmental relationships and this model is constructed of three dimensions.

Based on the feedback of the raters regarding the intuitive utility and face validity of the facets, as well as the determination to test the original model as fully as possible, it was decided to continue to analyze the data as a multiple component model. In continuing along this line, it was hoped that the character of the environmental relationship could be better described; it was possible, for instance, that one of the components may emerge to be a dominant theme.

Novices and Old-hands:

To complete the planned set of analyses, a multivariate analysis of variance (MANOVA) was carried out using the three component scores as dependent variables. An independent variable, Experience, was created by dividing the respondents into two groups, Novices (those who had spent less than one season or six months in the polar regions), and Old-Hands (those who had spent greater than six months or were in their second season). The cut-off point of six months was derived rationally: in the High Arctic, the normal length of time spent at a polar station or camp is between one and three months. Anyone reporting more than six months' experience is likely to have returned to the region more than once. In the Antarctic, more than six months' experience indicates either that you have returned at least once or have spent an entire winter on site. In addition, the interviews indicated that people who have less than six months' "time in" have had a qualitatively different experience from those who have spent more than six months in the polar regions. Separating the respondents along this criterion yielded 17 Novices and 16 Old-Hands.

The creation of these two groups using a time criterion introduced the possibility of a competing explanation for any differences found to exist between the two experience levels: Old-Hands, because they need more time to acquire the experience necessary to become "old" hands, may on average be older than Novices. In order to check the necessity of using age as a covariate, a simple t -test was conducted with Age as the dependent variable and Experience as the independent variable. The result of this analysis indicated that age was not significantly related to the Experience variable [$t(31)=1.84, n.s.$].

With this assurance, a Hotelling's T^2 analysis was carried out using Passion, Intimacy, and Commitment as the dependent variables and Experience as the independent variable. The outcome of this test indicated that a reliable difference existed between the two groups [$T^2 = 9.36$, approximate $F(3, 29) = 3.02$, $p < .05$]. Exploration of this finding using a series of t -tests showed a significant difference only on the Passion vertex [$t(32) = 3.10$, $p < .005$]. The means of the overall environmental relationship (the mean of passion, intimacy, and commitment) and the means of the separate vertices are given for each of the Experience levels in Figures 2 and 3, respectively.

To test the hypothesized passionate-companionate process in environmental relationships, a composite variable was derived by finding the mean of the Intimacy and Commitment variables; this was designated as a "Companionate" variable and was contrasted to the Passion variable across the two Experience levels. It was not surprising, given the fact that this analysis is a simplified version of the analysis immediately above, that a significant difference existed between the Novices and Old-Hands on these two variables [$T^2 = 9.63$, approximate $F(2,30) = 4.66$, $p < .02$]. Similarly, the two Experience levels were reliably separable only on the Passion measure (see above) and not on the Companionate variable [$t(32) = 1.56$, *n.s.*].

Discussion

Three hypotheses were investigated in the initial study. The first had to do with the applicability of the interpersonal relationship metaphor with respect to environmental relationships. Inasmuch as the raters experienced little or no trouble in making their judgments based on the modified Sternberg scale, it would seem that this is, at least in these initial stages, a useful paradigm to employ. The raters' debriefing comments regarding the ease with which they were able to assign scores is a particularly compelling argument.

In regard to the statistical analyses, the high concordances on the Passion and Commitment dimensions suggests that all raters were making their judgments using similar criteria. The Intimacy vertex is obviously problematic: the raters' debriefing comments showed

Figure 2. Interview Ratings: Composite of Passion, Intimacy and Commitment in Novices and Old-Hands

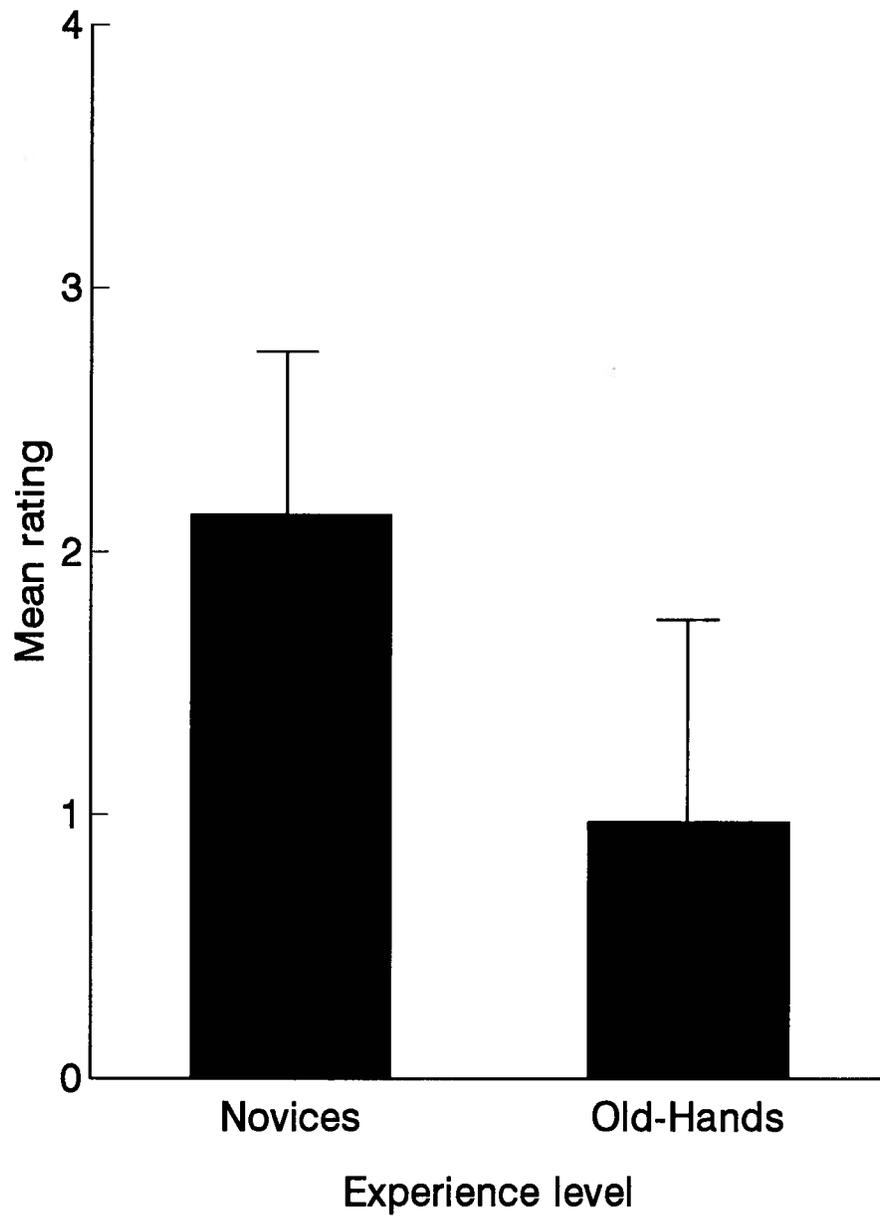
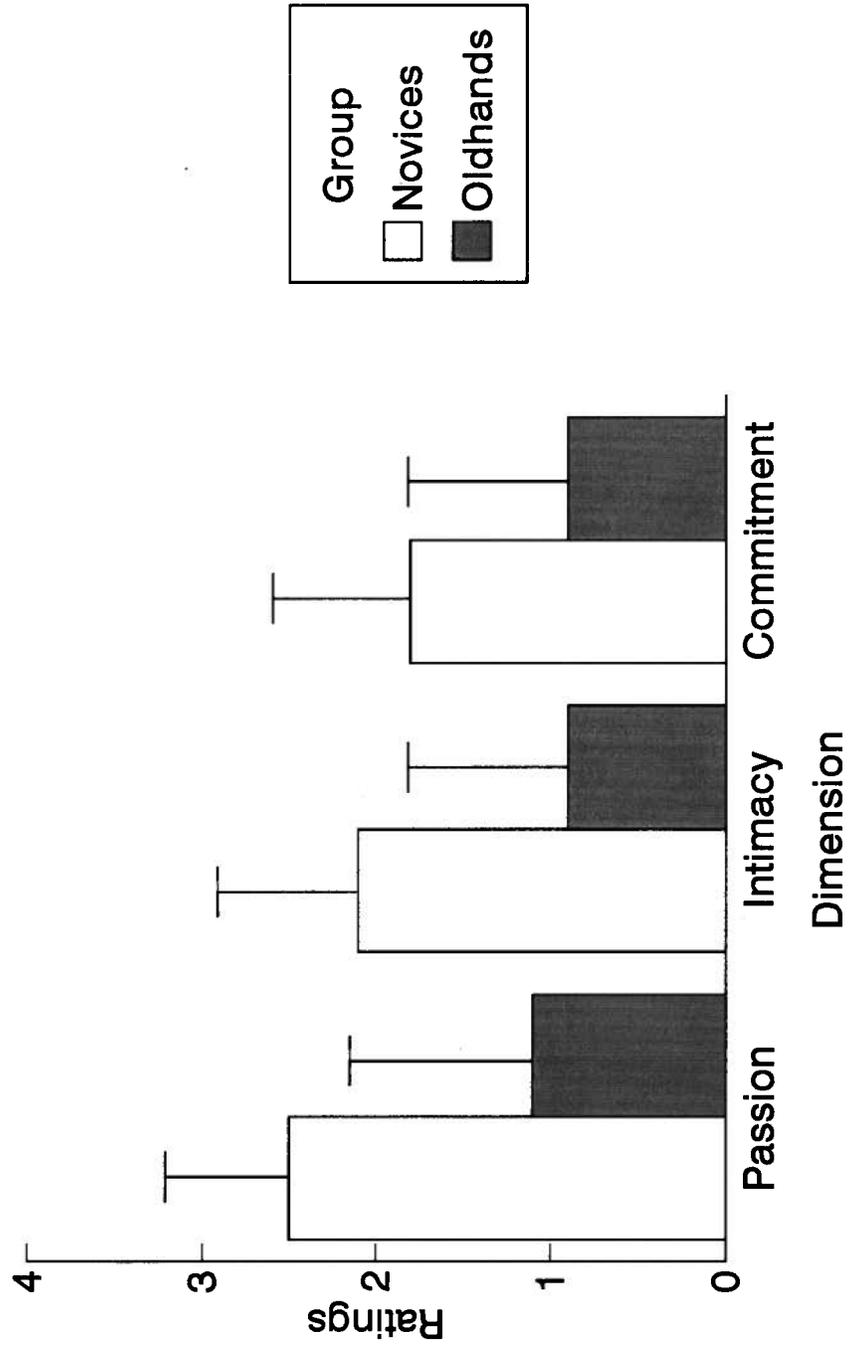


Figure 3. Interview Ratings: Separate Passion, Intimacy and Commitment in Novices and Old-Hands



quite clearly that the raters were using two slightly different shadings of this vertex in making their judgments. These two methods of assessing Intimacy were found to correspond most closely to the concepts of *caring* and *depth of knowledge*. Intuitively, these concepts do seem to tap different aspects of the intimacy vertex. Depth of knowledge may be seen as a cognitive component, whereas Caring seems to be primarily affective. In any event, if one is to continue to argue for a multi-factor model of environmental relationships, it may be more profitable to split the intimacy vertex into these two new components.

The validity of the multiple-component model itself is clearly open to question. The high intercorrelations among the vertices indicate that we are dealing with a unidimensional concept. This finding is supported in the multivariate analysis: the differences between the Novices and the Old-Hands are apparent when we take all three dimensions into consideration, and the univariate analyses suggest that the variance in this contrast is due primarily to the manner in which the two groups differ in their passion for the polar region. One's experience in the polar regions apparently is not strongly associated with how intimate or committed one feels about the regions.

This was a bit of a surprise. At the very least, we would have expected the Old-Hands to demonstrate a greater depth of knowledge (and thus greater intimacy) about the region simply because they had been there longer. One possible explanation for this finding may be that the methodology used in collecting the data may not have tapped the knowledge base of the Old-Hands: the interview protocol, with its unstructured format, promoted free recall as opposed to asking explicit questions. In the free recall situation, Old-Hands may not be volunteering the bulk of the information they possess because, after they have been using the information for over six months, it is seen as trivial, unimportant, or even boring. Novices, because the same information is so much "fresher", are less likely to see it as dull or uninteresting.

The special contrast based on the passionate-companionate model of relationship stages lends support to the idea that environmental relationships are similar to interpersonal relationships. While the orthogonality of Passion, Intimacy, and Commitment may be open to

question, it seems obvious from the data that environmental relationships, like interpersonal relationships, are more passionate at the beginning .

STUDY 2: SELF-RATED ENVIRONMENTAL RELATIONSHIPS

Methodology

Rationale

While interview data may be particularly useful at the exploratory stage of research in a new area, the interpretive nature of the analysis of such data may leave it open to criticisms of subjective bias and a certain lack of rigour normally (although often spuriously) associated with qualitative methods. In addition, certain characteristics of the individual are often difficult to assess in an exploratory, free-recall situation; the problematic assessment of environmental intimacy discussed in the first study is an example of such a difficulty. Moving to the use of a self-report measure bypasses these stumbling blocks to a great extent.

There are other, more practical, reasons for the introduction of a second measurement tool. In order to move interview research beyond a single interviewer, a standardized training and testing protocol must be developed. Interviewers need to be trained in general interviewing techniques as well as the specifics of the research interview itself. As a technique, interviews are time-consuming to conduct and analyze, and circumstances may bar the researcher from being on-site or, once there, from having a space sufficiently private to discuss personal topics.

A self-administered form, on the other hand, may be administered to the research sample even when the researcher cannot be present. It allows the researcher access to the powerful statistical models of quantitative methodology and it facilitates the gathering of a relatively large amount of data in a short time, making it ideal for studying populations that may be together only for a brief period. Finally, it has been argued in numerous recent discussions (see, e.g., Altman and Rogoff, 1987; Wicker, 1992) that a variety of distinct methodologies should be employed when investigating new phenomena.

For these reasons, it was felt that a self-administered form needed to be developed to measure environmental relationships in polar regions. Such a form would complement and extend the more qualitative work carried out in the initial study.

Development of the Form

The collection of scale data was meant to extend the work carried out in the previous interview study. To this end, it was decided to re-word and shorten the "Judge's Package", keeping the basic definitions and substituting verbally anchored, five-point scales for each vertex. Each vertex scale would now be preceded by a stem that asked the respondent how, according to the definition given of the vertex, he or she rated him- or herself on each of the three dimensions. In the case of collateral data, the stem asked the rater to give his or her ratings of the respondent on the same dimensions.

It was felt that it would be difficult for the respondents and collateral raters to separate the interpersonal concepts of passion, intimacy, and commitment from their less familiar environmental counterparts. Because the interpersonal concepts are in such widespread use, along with their altogether diverse and sundry meanings, it was necessary that extra precautions be taken to ensure that the definitions given in the rating packages were the ones the respondents used in making their ratings. Therefore, the anchor wording below the scale was changed slightly in order to disguise the connection to the interpersonal relationship model, and the vertices were re-labeled "Pas", "Int", and "Com". The form was dubbed the PIC (Passion-Intimacy-Commitment) Form at this time.

Despite the knowledge that there had been problems with the Intimacy vertex in the interview study, it was decided to continue using the vertex and its definition as it stood. This was done for a number of reasons, several of which have been covered in the Results section of the interview study above. In addition to these aforementioned reasons, it was felt that the use of a different methodological approach, namely self-rating, justified staying with the model as it was originally conceived. It was possible that the results of the interview study were due to some unknown artifact of the methodology. Continuing with the three-dimensional model allowed for a

much more direct comparison of results across the two studies and enabled the results of the self-rating methodology to test the modified Sternberg model.

Unlike the previous study, this research was to be carried out solely in the High Arctic, because of funding and time constraints. Although this initially appeared to be a drawback, it was turned to an advantage by focusing the responses on a common region. Thus, the respondents were asked to give their ratings based on how they felt about the widest geographic "common denominator", namely the High Arctic.

In addition to the collateral and self-ratings on the three dimensions, data (months of experience in the Arctic) were gathered that allowed separation of the group into Novice (n=16) and Old-hands (n=14) , as well as sex, age, and the type of site in which the respondents conducted their research or performed their jobs (base camp, i.e., Resolute, or fly-in field camp). This last information was taken because it had become clear over the course of prior research that a sojourner's *experience* at these two types of places can be quite different; it has been noted elsewhere (Suedfeld, 1990) that it is often more appropriate to look at the distinctions of experience than the distinctions of place. Collection of these data was felt to be prudent in light of the potential influence of these specific site types on ratings having to do with a more general environment (the High Arctic).

The collateral rating sheets were identical to the self-rating sheets except that the stem for each vertex referred to the original respondent (the self-rater). It was felt that the accuracy of the collateral rating may be affected by how well the collateral rater knew the original respondent. Two indices were used to tap this possible effect: The first asked the collateral rater how long (in months) he or she had known the respondent; the second asked the collateral rater to indicate, on a seven-point Likert scale, how well she or he knows the respondent. For a complete sample of the scales given to the self-rater and the collateral rater, please see Appendix 3.

Data Collection Site

The PIC Form study was carried out in Resolute, N.W.T., Canada. However, as described above, the places where the respondents derived their experience of "the High Arctic" varied as to base camp or fly-in camp (see interview study, above, for descriptions of Resolute and the field sites).

Respondents

Respondents were recruited in person by the researcher while he was in Resolute, during a two-week period in the 1993 summer season. Each potential respondent was approached individually and, after receiving a brief verbal description of the study and its goals, was asked to participate. Of the forty-one scientists, government workers, and support personnel contacted in this manner, only one immediately declined to take part in the research. Ten others failed to return their questionnaires (in line with ethical guidelines, their reasons for not participating were not probed). Thus, the data in this study is based on a 75% return rate of all distributed questionnaires.

Of the thirty self-rating respondents who participated in this study, twenty-one were men and nine were women. The mean age of the respondents was thirty-four years ($SD = 10.6$) and, on average, they had twenty-two months ($SD = 35.5$) of High Arctic experience spread across 2 or more seasons. A breakdown of Sex by Site by Experience level is given in Table 3.

Table 3. Respondents in Self-rated PIC Study

	Base camp		Field camp		Total
	Novice	Old Hand	Novice	Old-Hand	
Male	3	6	6	6	21
Female	2	0	5	2	9
Total	5	6	11	8	30

Collateral ratings were collected on twenty-nine of the respondents (return rate = 73%).

On the basis of their indices, these collateral raters seemed to be well suited to giving

assessments: the mean length of time the collateral rater had known the respondent was fifty-three months ($SD = 62.5$), or just under four and a half years, while the collateral raters' mean response to the question "How well do you know the subject?" was 4.8 out of the possible seven ($SD = 1.41$). Please note that a rating of five corresponded to the phrasing "I know this person quite well".

It should also be noted that eight collateral raters elected to complete the self-rating form as well; in these cases, the original respondent served as their collateral. Thus, of the thirty self-rating subjects, sixteen were also collateral raters.

Procedure

Respondents were given a package that contained the self-rated and peer-rated scales, and a cover sheet explaining the rights of the subject and procedures necessary to complete and return each of these. Each of the respondents was asked to nominate a person in Resolute who was capable of discerning the respondent's feelings about the High Arctic. This person was then recruited either by the respondent or the researcher. In most cases, the collateral rater was sitting nearby and so was able to give immediate consent. All potential collateral raters agreed to participate.

Respondents and collateral raters were asked to complete the forms and return them to a box located in the lounge area of the Polar Continental Shelf Project's residence. For those whom this procedure posed a difficulty (e.g., they did not live near the residence and/or had no reason to visit there), arrangements were made to contact the researcher when the forms had been completed and ready for pick-up.

This latter method of returning the forms threatened to compromise the anonymous and voluntary nature of the respondents' participation inasmuch as respondents may have felt some social pressure to participate. To reduce any such pressure, the topic of the study was never raised by the researcher again in the presence of any potential participant (unless, of course, participants themselves approached the researcher). Essentially, a "one-way" (participant to researcher) line of communication was imposed by the researcher.

Results

Data Reduction

Scoring of the PIC Forms proceeded as follows: very low = -4, somewhat low = -2, neither high nor low = 0, somewhat high = 2, and very high = 4. This preserved the range used in Study 1. The participants' self-ratings and their collateral ratings were entered directly into the initial data matrix following the same scoring scheme as used with the interviews (+4 = very high on the scale, -4 = very low on the scale). As in the interview study, the respondents were divided into Novices and Old-Hands based on the time each had spent in the High Arctic during the course of their adult life: Novices had spent less than six months and Old-Hands had spent more than six months.

Analyses

Self-Ratings and Collateral Ratings:

The self/collateral ratings were compared in order to assess the validity of the self-rating approach. Self-ratings are notoriously prone to biases such as social desirability and it is therefore useful to determine if there were any large influences on the respondents' own ratings.

Correlations between the self-ratings and those given by the collateral rater showed strong agreement between the two raters on all three vertices. Ratings on the Passion vertex showed the highest amount of agreement ($r = .72$); consensus on the Commitment vertex approached a similar level ($r = .65$), while the agreement on the Intimacy vertex was lower but still acceptable ($r = .57$). All three correlations were significant at $p < .001$. Given the strength of the relationship between the two sets of ratings, it was decided to proceed using only the self-ratings for the final sets of analyses.

Independence of the Vertices:

As in the interview study, a theoretical concern was the amount of overlap in the three vertices. One of the aims of this study was to investigate whether or not the environmental relationship was multidimensional: could it be meaningfully discussed in terms of several components?

A series of correlations were computed in order to examine the interrelationships of the vertices. This matrix is given in Table 4.

Table 4. Intercorrelations of PIC vertices: respondents and collateral raters (n = 30 and n = 29, respectively; all correlations significant at p=.001).

	Self-rated			Collateral	
	Passion	Intimacy	Commitment	Passion	Intimacy
Self-rated					
Intimacy	.59				
Self-rated					
Commitment	.62	.59			
Collateral					
Passion	.72	.64	.68		
Collateral					
Intimacy	.69	.57	.64	.79	
Collateral					
Commitment	.78	.58	.65	.81	.67

The pattern of correlations is similar to that found in the interview study; if anything, evidence of the monolithic structure in environmental relationships is even stronger in these data.

Sex Differences:

While the proportions of men and women in this study were more representative of polar populations than were the proportions in the interview sample, a sex differences analysis was run in order to keep a methodological isomorphism with the interview study.

A Hotelling's T^2 analysis was conducted using sex as the independent variable and the three self-ratings as the dependent variables. The result of this analysis indicated that there

were no reliable differences between the sexes on the three measures [$\eta^2=2.48$, $F(3,26)=.77$, *n.s.*].

Novices and Old-Hands:

As with the interview study, the sample was divided into Novices and Old-Hands. A *t*-test was conducted to assess whether or not the age of the subject was related to membership in either group. In contrast to the first study, the result of this *t*-test showed that age was significantly associated with group membership [mean age of Novices = 30.3 years, *SD* = 9.6 years; mean age of Old-Hands = 38.3 years, *SD* = 10.5 years; $t(28) = 2.18$, $p < .05$]. Based on this finding, it was decided to introduce Age as a covariate in the multivariate analysis of the relationship between Experience and the three vertices. A conservative approach was thus adopted, given that the age difference between the two Experience levels only amounted to an effect size of .75 and a regression analysis using Passion, Intimacy, and Commitment to predict Age was not statistically significant ($R^2 = .09$, *n.s.*)

A multivariate analysis of covariance (MANCOVA) analysis was conducted with Experience as the between-subjects factor, Passion, Intimacy, and Commitment as the dependent variables, and Age as the covariate. The outcome of this analysis indicated a reliable difference existed between the two groups when considering the variance of all three vertices taken together [Wilks $\lambda = .72$, approximate $F(3,25) = 3.29$, $p < .03$]. Old-Hands showed a higher mean composite "environmental relationship rating" than the Novices; this relationship is given in Figure 4.

Given this finding at the multivariate level, further probing using Bonferroni-corrected *t*-tests were run. The results of these analyses indicated that none of the vertices taken individually reliably distinguished Novices from Old-Hands [Passion: $t(28) = 1.37$; Intimacy: $t(28) = 2.34$; Commitment: $t(28) = 1.61$; all results *n.s.*]. Figure 5 displays the means for each of the vertices by experience level.

Figure 4. PIC Self-Ratings: Composite of Passion, Intimacy and Commitment in Novices and Old-Hands

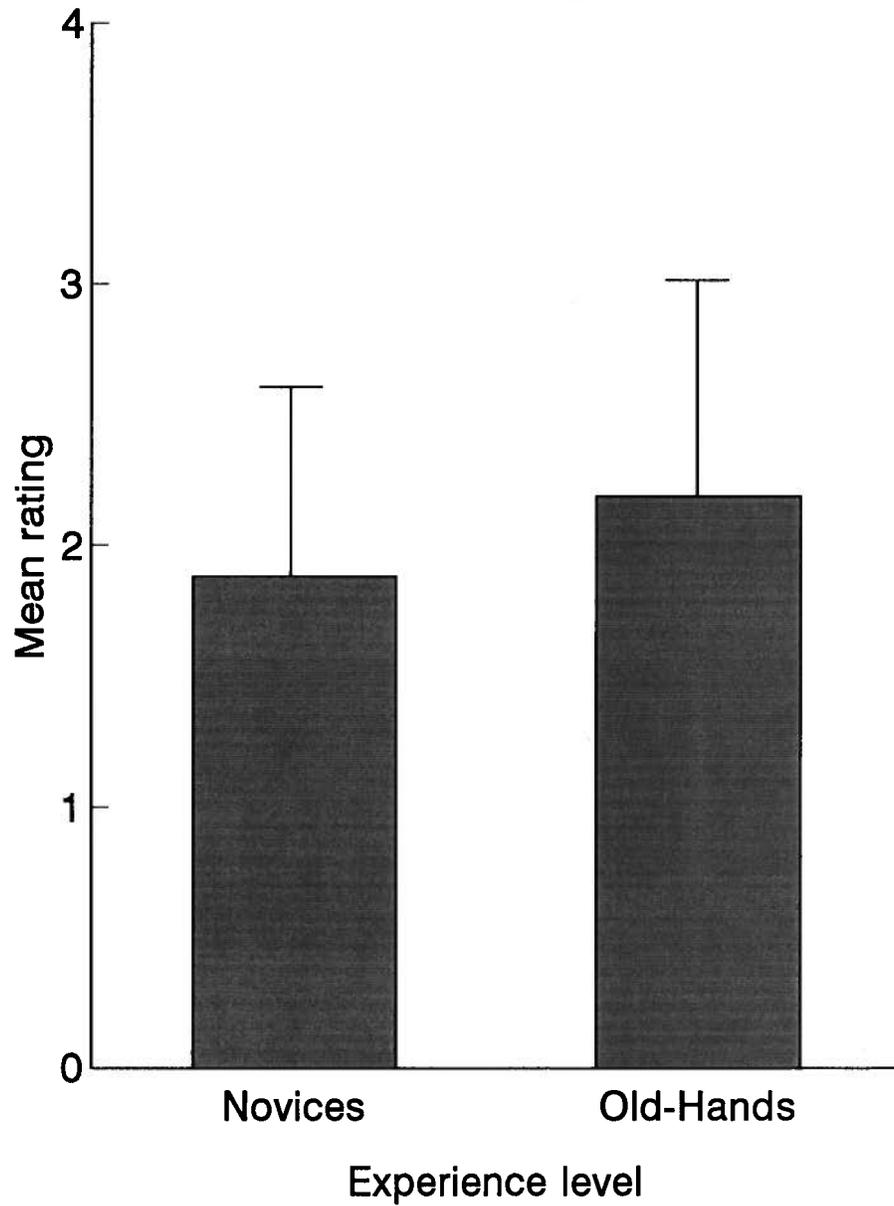
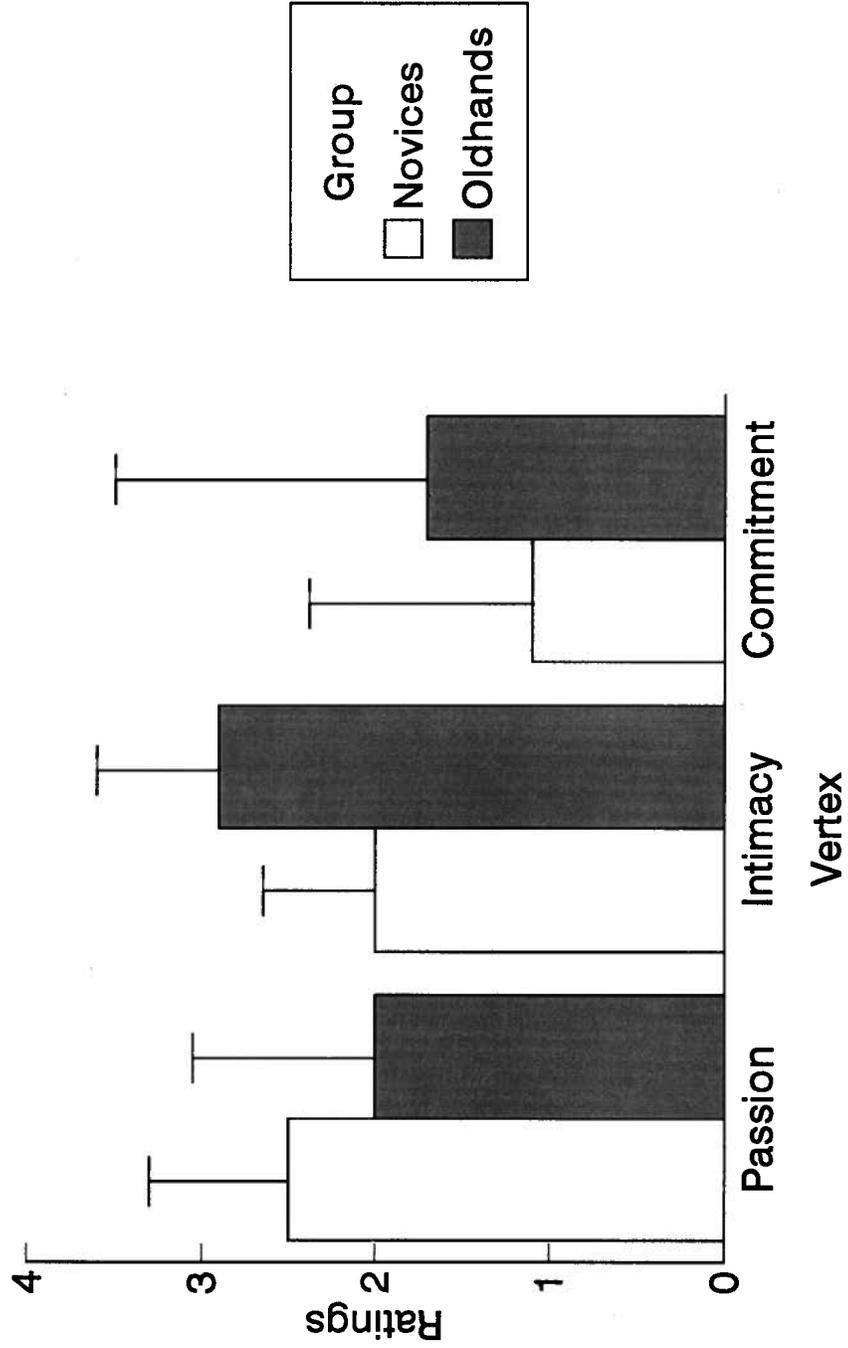


Figure 5. PIC Self-Ratings: Separate Passion, Intimacy and Commitment in Novices and Old-Hands



While not reliably different, it is notable that the pattern of the self-ratings is in precisely the form predicted by interpersonal theory: Novices are highest in Passion and Old-Hands are highest in Intimacy and Commitment.

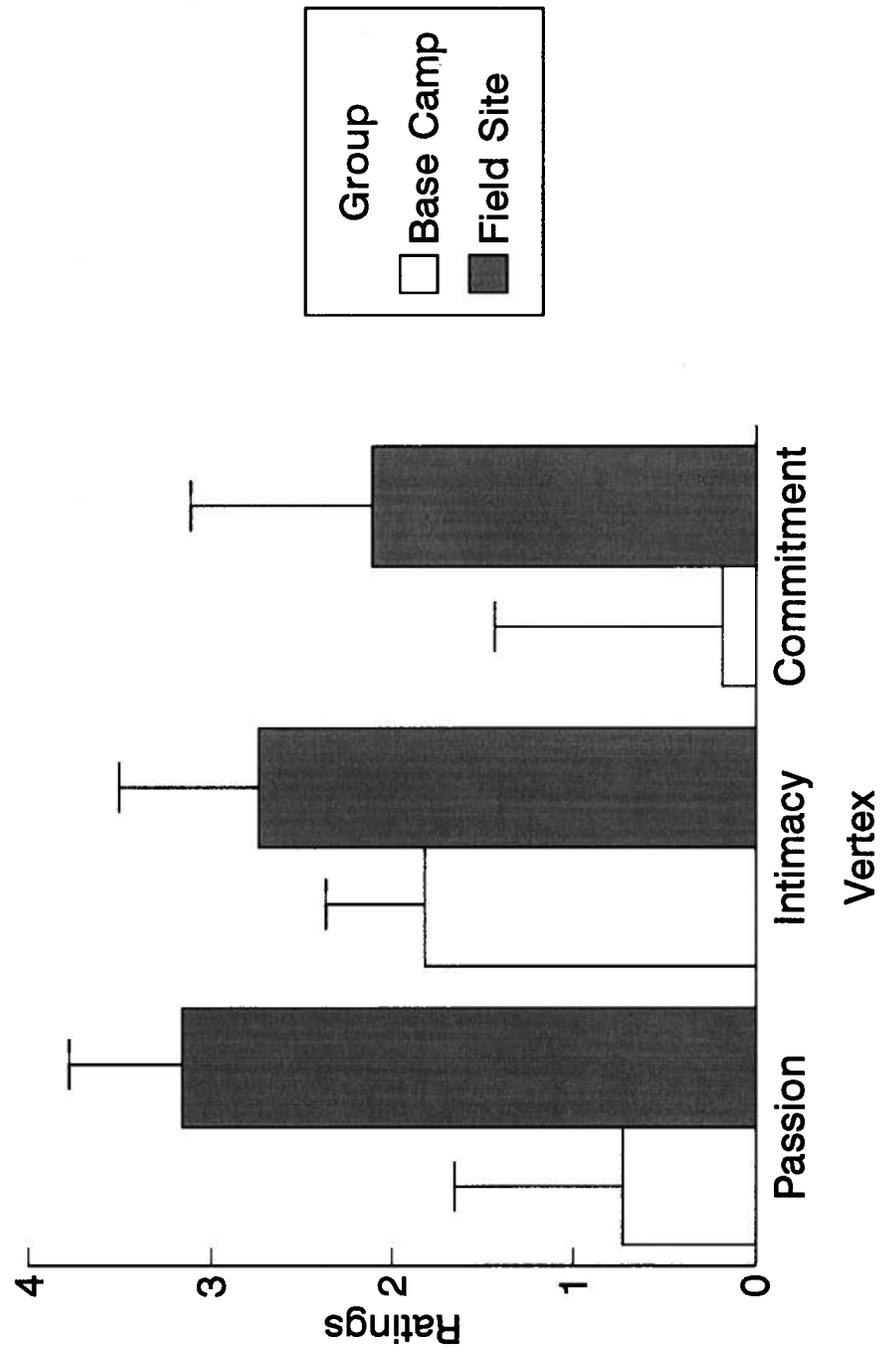
The hypothesized passionate-companionate progression was tested in exactly the same manner as in the first study: A composite "Companionate" variable was created by finding the mean of the Intimacy and Commitment ratings. The Passion and Companionate variables were then entered into a MANCOVA with Experience as the independent variable and Age as a covariate. No significant differences were found between the two Experience levels [Wilks $\lambda = .84$, approximate $F(2,26) = 2.52$, *n.s.*].

Beyond the Initial Hypotheses: Exploratory Analyses:

The results thus far indicated that a person's level of experience in the High Arctic affected how one evaluated one's general relationship with the area, but the three vertices considered separately are less strongly related to the length of exposure to the environment. It was noted above, however, that experiences in field sites and base camp can be markedly different. As these data are immediately available and the area of this dissertation is, after all, *environmental* psychology, it was felt that it may be enlightening to explore the potential differences between relationships to the two types of sites.

The Site analysis split the respondents into Base camp ($n=11$) and Field camp ($n=19$) personnel. A Hotelling's T^2 analysis was performed, using these two categories as the independent measure and the three self-rated vertex scores as the dependent measures. The results indicated that a reliable difference existed between the two groups ($T^2 = 23.11$, $F(3,26) = 6.88$, $p = .001$). Univariate t -tests for each vertex revealed that the differences between the two site types stemmed from the Passion self-ratings [$t(28) = -4.68$, $p < .001$] and Commitment self-ratings [$t(28) = -2.38$, $p < .025$]. The difference between the two sites on the Intimacy self-ratings was not significant [$t(28) = -2.38$, *n.s.*]. The means for each vertex, by site, can be found in Figure 6.

Figure 6. PIC Self-Ratings: Separate Passion, Intimacy, and Commitment in Base Camp and Field Camp Personnel



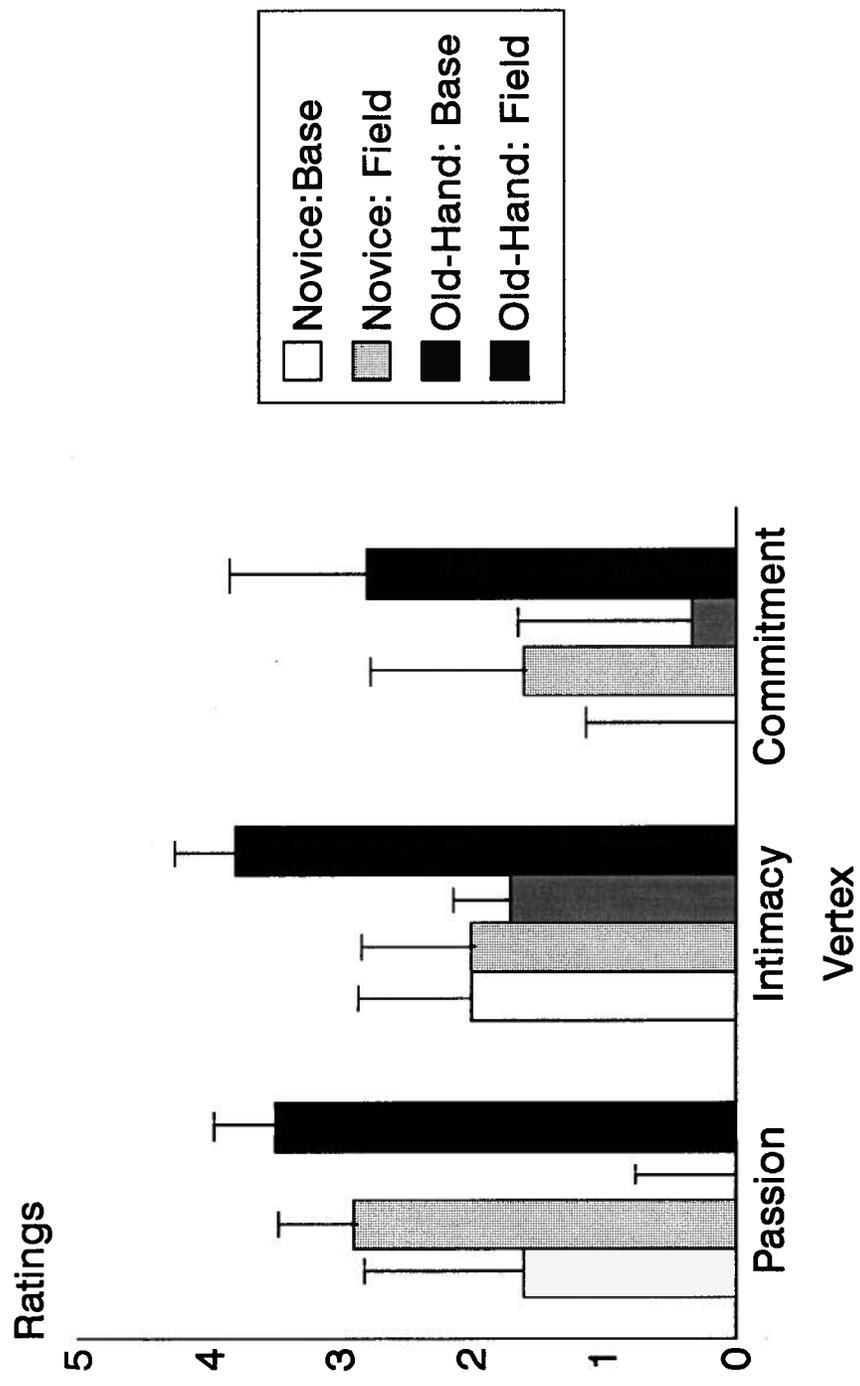
It is clear that the differences between the Base Camp personnel and the Field Site personnel were quite substantial. The amount of Passion, in particular, was quite pronounced in Field Site respondents.

In introducing the Site variable, there arose the possibility of an interactive effect between it and experience; this also needed to be tested. A second exploratory analysis, Novice and Old-Hand differences as a function of the type of site, presented some difficulties. First, the number of respondents in each cell of the analysis became quite small once the Novices and Old-Hands were separated into field site and base camp groups; this drastically reduced the power of any significance test. Second, there was a pre-existing difference between base camp and field site personnel that may better explain any differences between the two groups. The base camp personnel are, in general, support staff and government employees, whose jobs are based in the North; field site personnel, on the other hand, tend to be either government or university research scientists. Recent work conducted in the two polar regions has suggested that these occupational groups differ from each other on broad personality factors (Steel & Suedfeld, under review) and it seems reasonable that the basic reason for one's being at a location would have some influence on one's relationship with that place.

With these constraints and pre-existing conditions in mind, it was decided that a set of simple descriptive statistics would be the most appropriate form of analysis. Means and standard deviations were calculated for each of the vertices by Experience and Site; these were then graphed in order to examine the pattern of differences. This graph can be found in Figure 7.

The graph shows a clear difference between the Old-Hands at a field site and all other groups. Interestingly, the Old-Hands at base camp held the least positive attachment, although Novices in base camp held an equally "cold" feeling towards the place; these ratings (Passion =0.00) were, in fact, the lowest of all the ratings. Old-Hands showed the widest spread between Base and Field sites; Novices at both sites did not display as much of a difference and fall roughly between the extremes of the two Old-Hand groups. Collapsing the data across all three

Figure 7. PIC Self-Ratings: Separate Passion, Intimacy, and Commitment; Experience Level by Site Type



vertices, we see that the Old-Hands hold the strongest positive attachment to the High Arctic. The means of the composite of the vertices of the four groups, Experience by Site, are shown in Figure 8.

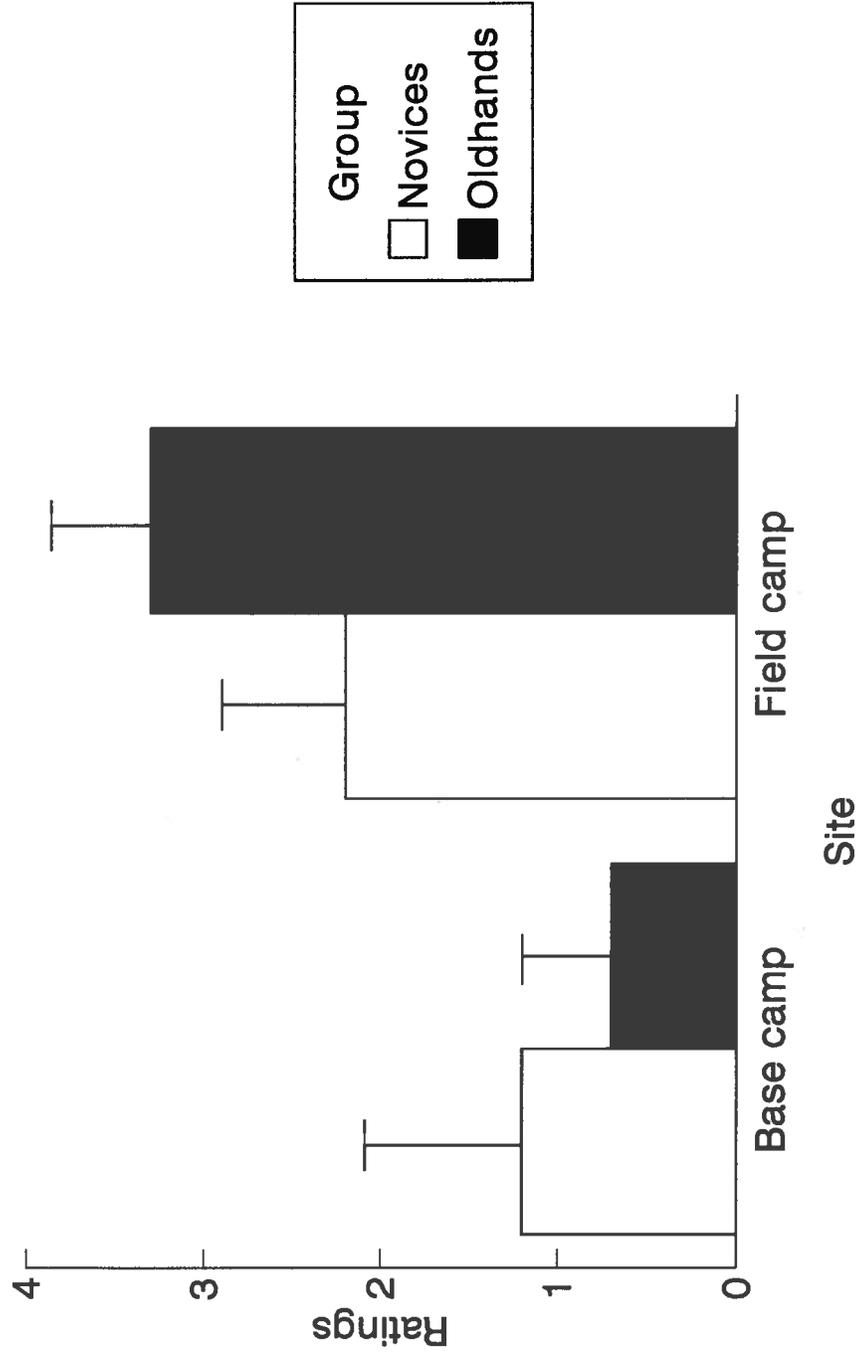
Discussion

This study utilized a second type of methodology, namely the self-rated assessment of one's environmental relationship. As mentioned above, this technique is prone to a number of biases, the strongest of which is likely the propensity to show oneself "in a good light". Because of this, the self-assessment needed to be tested against an external criterion. The strength of the association between the respondents and their collateral raters suggests that this methodology is a valid gauge of one's actual environmental relationship (as defined by the PIC Form). While the strengths of the Correlations on all three vertices are acceptable, the Intimacy vertex continues in its role as the problem child of this theory.

The results from the PIC Form analyses once again yield little support for a "triangular" model of environmental relationships. From the empirical viewpoint, the high intercorrelations among the three vertices suggests that the separation of the environmental relationship into "passion", "intimacy", and "commitment" gains us little in the way of predictive power. These may actually be overlapping constructs.

This is not to say that the vertices may not be of some use in describing environmental relationships in polar regions. For example, one may still speak of having a great passion for a place; it must simply be remembered that such a passion likely entails a high degree of both intimacy and commitment. This, in itself, is useful as a contribution to theory: environmental relationships are not easily categorized via the differential combination of the three vertices as, for example, 'friendly' (low passion, medium intimacy, medium commitment) or "cold" ("negative" passion, absence of intimacy and commitment). The single dimension of the environmental structure seems to run from a "consummate love" to a "consummate opposite of love".

Figure 8. PIC Self-Ratings: Composite Passion, Intimacy, and Commitment: Experience Level by Site Type



The rationale for dividing the polar population into "Old-Hands" and "Novices" was that the duration of an interpersonal relationship has been shown to be related to the amount of passion in that relationship. It was felt that, in a person-environment analogue model, experience in an environment would modify one's overall environmental relationship, and that such experiences would have a particular impact on one's passion for a place. It was found that only when one took the amalgam of Passion, Intimacy, and Commitment was one able to reliably distinguish Novices from Old-Hands. No single vertex was reliably associated with one's experience in the Arctic. This is very much in line with the construct overlap of the vertices (described immediately above) but, given the consistent findings in the "passionate-companionate" literature regarding the pre-eminence of passion in new interpersonal relationships, it led to some speculation as to why environmental relationships might differ from interpersonal relationships in such a pronounced manner.

One of the key differences between interpersonal and environmental relationships has to do with interdependence. In interpersonal relationships, the interdependence is real, whereas in the environmental relationship it is, at most, an illusion. The polar regions simply do not "behave" with any degree of intentionality towards the sojourner (as several interview respondents independently noted, it doesn't "care" about the sojourner); interdependence in the person-environment relationship is solely a percept of the person. This real versus illusory interdependence may have different consequences for the two types of relationships. For example, it is unlikely that an interpersonal relationship will re-establish itself if it breaks up before the couple has had time to form a commitment to each other. Such a reconciliation requires the consensus of two individuals and, with little invested in the relationship, at least one partner may not feel inclined to continue or start again. In the environmental relationship, the "reconciliation" depends solely on one person. If a sojourner who is passionate about the Arctic burns out, even early in the relationship, and then "re-ignites" at a later date, there is little to stop him or her from pursuing that feeling. There may be barriers to the person returning to the Arctic, but they are barriers that are essentially external to the environmental relationship (e.g.,

selection procedures) and are generally not insurmountable. One is comparatively free to return to the "arms" of the Arctic; this is not quite the case when one is dealing with another person.

Because the environmental relationship is so open-ended and one-sided, there arises the possibility that the Old-Hands group is simply comprised of people who have chosen to pursue their love of the place. In other words, experience in the Arctic may not induce a love of the Arctic, but rather a love of the Arctic may lead to one's gaining more experience in the region. At this point, we have no empirical reasons for deciding between the two interpretations. A long-term longitudinal study, with careful tracking of both returners and non-returners, would need to be mounted in order to answer the question.

Longitudinal work would address another question that arose from the cross-sectional methodology used in this study. The analyses indicate that age may account for some of the differential patterning of the scores. The use of age as a covariate can statistically adjust the differences in the mean ages between Novice and Old-Hands; however, as the definition that delineates the experience levels is itself based on the passage of time, the influence of these two variables may ultimately be inseparable.

The exploration of the effect of the different types of sites (field camps and base camps) garnered some interesting results. The reliability of the pattern of means suggested that having spent your time in a field camp was a near-guarantee of having a more intense and pleasurable overall environmental relationship. There are at least two possible reasons for this pattern. The first has to do with social aspects of the work environment and the second has as its basis the physical features of the places themselves.

It is quite likely that returning to a location because it is your job (or, more accurately, because you receive a wage for working at that site) influences your feelings about the place. The base camp is primarily a worksite for most of our respondents; as such, it is also a co-location of management. The close proximity of management personnel was stated to be a negative environmental feature by several of the interview respondents, and this irritant can be exacerbated if the worker finds him- or herself literally living side-by-side with "the boss".

Management personnel, particularly in isolated and remote settings, are often regarded as more than slightly superfluous and knowing little about the jobs that "really" need doing. They are certainly seen as being poor judges of the value of one's job to the camp. Incidental information gleaned in the course of the interviews suggests that this certainly seems to be the case in the polar regions. Illustrating this point, one of the respondents suggested that a major benefit of wintering over is that "all of the bureaucrats are gone and so we just do our little jobs". A similar situation exists for the average field worker, but the hierarchical nature of most field camps is less pronounced, partly because there are so few people in camp and the chores, of necessity, must be shared by everyone. This tends to render the field camp situation somewhat more egalitarian than that in base camp, and thus may defuse potentially problematic "us versus them" scenarios.

The physical features of the base camps and field camps offer another reason for the differences in the environmental relationships. The two site types differ markedly in the degree of "wilderness" that each represents; this quality has been shown to be related to place attachment (Williams, Patterson, Roggenbuck, & Watson, 1992). In Resolute, one is usually housed in a building that is heated, has bathing and laundry facilities, comfortable sleeping quarters, and a free commissary. There is a nurse's station nearby, and one has access to flights south almost on a daily basis. The usual field site researcher or worker, on the other hand, would consider him- or herself fortunate to be able to have a lukewarm sponge bath every other week. (As an afterthought, it's likely that it would be the researcher's co-workers that would consider themselves lucky). Field camps are often primitive, at best, in terms of food and shelter; field workers may live for weeks in a few small tents and they tend to rotate kitchen and other camp duties, lack of talent in these areas notwithstanding. Water in High Arctic summer camps is a concern, both with respect to quantity and quality. The first aid kit and a co-workers' training are the field worker's only immediate medical aid, while transportation to the South can often be delayed up to a week or more due to poor weather conditions.

Given the description above, it seems, at first glance, unlikely that the field worker would show the greatest love for the High Arctic, but it can be argued that it is precisely these rough-and-tumble conditions that engender such an intensity of positive feeling. This will be dealt with in greater detail below in the General Discussion, but stated briefly one may hypothesize that at least part of the allure of polar sojourning is the regions' inherent "call of the wild".

Challenges met and overcome are inherently rewarding. In field camps, acquisition of knowledge and Arctic survival skills may lead to confidence and enjoyment (and it should be noted here that the only ones to return to the Arctic tend to be those individuals who have acquired these skills); conversely, in base camp, this lack of challenge may lead to boredom, apathy, or a feeling of being disillusioned. When the interaction between experience levels and the types of sites is examined, one notes that Novices in Resolute rate themselves as higher on Passion and Intimacy and lower on Commitment than do the Old-Hands. Novices, by definition, have little or no experience in the Arctic. For this group, their first view of a polar region, with its midnight sun and freezing temperatures of mid-summer, is not only novel (a factor associated with higher ratings of aesthetic appraisal; Berlyne, 1974), it is often an emotionally intense moment as well. As one respondent stated,

"the breathtaking beauty when you first step off the plane...it's pretty overwhelming...I was lucky the weather was blue and it was windy and cold but you know it's just crisp and snaps you right to attention and I liked it right away".

Running completely contrary to interpersonal love theory, Field Camp respondents' passion was actually *higher* in the Old-Hands, suggesting that experience in a field location may actually increase one's passion for that place. In fact, Old-Hands from a field site assessed themselves as being far more passionate, more knowledgeable and caring, and more deeply committed to the Arctic, than did any other of the subgroups. In short, they were much more in love with the Arctic.

One's arrival in Resolute can be the culmination of a dream; at the very least, it is the culmination of a great deal of effort. It is not until later, when the Novice had had a chance to

realize that the Base Camp is hardly representative of the greater part of the Arctic, that this passionate response is modified. In the instance where the Novice heads out into the field, this passion seems likely to grow; if the Novice stays in Base Camp, it seems likely to wane.

GENERAL DISCUSSION

Brief Summary of the Results

A brief recap of the results of the two studies is in order before we go on to discuss the overall implications of the research. First, all three groups of participants (interview raters, self-raters, and collateral raters) in the two studies affirmed that they were able to rate person-environment relationships using dimensions derived from interpersonal theory, although the Intimacy dimension was somewhat problematic in Study 1. Second, the results of Study 1 suggested that, as in research investigating the triangular model in interpersonal relationships, the interdependence of the three vertices is profound. The intercorrelations in Study 2, using a completely different methodology, confirmed this interdependence.

The strength of the correlations between the self-ratings and the collateral ratings collected in the second study indicated that employing self-report methodology in researching environmental relationships is useful and valid.

When the orthogonality of the dimensions was statistically forced in order to test the model in the multivariate analyses of varying levels of experience, only the Passion dimension showed any ability to distinguish reliably between the two groups. This result occurred in Study 1 and was not found again in Study 2, in which the Novices and Old-Hands did *not* differ reliably on any of the three dimensions.

Perhaps a more significant difference between the findings of the two studies came in the analysis of experience and a superordinate variable, hereafter referred to as Environmental Love, which was comprised of all three dimensions. Study 1 suggested that newcomers to the polar regions exhibited a greater amount of love for the area, whereas Study 2 suggested that those with greater experience in the polar region held it in greater regard.

Finally, the methodology employed in the second study allowed a probing of the effect of specific type of sites (Base Camp and Field Camp). The analyses of these data showed that field camps were associated with greater love of the High Arctic. The interaction between experience level and site type indicated that those with greater levels of experience and situated in a field camp felt a greater affection for the region.

General Implications of the Results

One of the fundamental inquiries undertaken in this dissertation dealt with the structure of the environmental relationship. The existence of environmental relationships, particularly those in the polar regions, was never in doubt. For evidence of this, we need go no further than the accounts given by polar explorers. In what can only be described as a rhapsodic portrait of the region near Cape Evans, in the Antarctic, Cherry-Garrard (1922/1989) noted that

Though I may struggle with inadequate expression to show the reader that this pure Land of the South has many gifts to squander upon those who woo her, chiefest of these gifts is that of her beauty. Next, perhaps, is that of grandeur and immensity, of giant mountains and limitless spaces, which must awe the most casual, and may well terrify the least imaginative of mortals. (p. 231)

Lest we attribute this description to an older style of writing, let us turn to a quick sketch of the continent given by Will Steger (1991), a modern-day adventurer...

For a moment Antarctica again offered us a glimpse of her most intimate side. Snow covered the rugged peaks, turning them soft and gentle. Sunset brought candy-colored hues of yellow and violet, which played on the distant ranges that marked the boundaries of Antarctica's mainland...Antarctica had taught us one thing our first month here: never trust it. It will reveal its most intimate side to you one day, then unleash a violent storm that makes you wish you were anywhere but here. There is no match for the mood swings Antarctica is famous for. (p. 85)

Clearly, a bond exists between these men and the place they describe so eloquently. The question that naturally arises, given the highly personal and (perceived) interactive nature of the accounts above, is: How similar is this relationship to other close, interdependent type of relationship in our lives, namely the interpersonal love relationship?

The answer to that question is that the similarity is marked, indeed. Not only were the three sets of raters (other, self, and peer) from the two studies able to rate their or other's relationship to a place using dimensions derived from interpersonal theory, but they were able to do so with relative ease. Using definitions derived primarily from Sternberg's model of interpersonal relationships, respondents rated passion for a place, the intimacy felt with a place, and the commitment held to a place or region.

The similarity of the structure of environmental relationships to close interpersonal relationships held even to an isomorphism with problematic theoretical points. The independence of the three dimensions posited by Sternberg has been called into question in more than one study and non-orthogonality showed up in environmental relationships. All three vertices exhibited a significant degree of intercorrelation in both Study 1 and Study 2. This indicates that, at least with respect to a definition of the environmental relationship as an amalgam of passion, intimacy, and commitment, the relationship exists as a monolithic structure. A taxonomy based on the three vertices, despite whatever intuitive appeal and theoretical elegance it may possess, does not accurately reflect the nature of the polar sojourner's relationship with the Arctic or Antarctic.

In contrast to a multi-component model, it seems that there is a single type of love for the polar regions, one dominated by passionate feelings. Note here that I speak of love without making reference to its antonym. The reason for not including love's opposite is that, by and large, that "cold, distant, and disinterested" feeling toward the area does not seem to exist as a general view of the polar regions, at least not in those who have direct experience with the areas. When the data from the two studies are combined, fully eighty-eight percent of our respondents scored above the zero point. Few respondents were rated, or rated themselves, as negative on a

combination of the three vertices or, for that matter, on each of the three separate vertices in either study. This was somewhat surprising until the makeup of the population was considered. These people are sojourners who, for one reason or another, elect to go to their respective polar regions. It is probable that people who truly dislike the high latitudes simply never go there in the first place or, if they do, they are less likely to return.

Although the results of the two studies were remarkably alike, there remain some differences. The interviews suggested that, based on a composite variable of passion, intimacy, and committed, newcomers to polar regions were more likely to be in love with the area than those who had more experience in the region; the self-report data suggested the opposite relationship was true. How can we reconcile these discrepancies?

The two studies used different methodologies in order to reduce the chance that findings could be ascribed to the research technique alone. Using such an approach, findings that are common to the two studies are strengthened through convergent validity. However, when the results are divergent, the differences in methods pose an alternative hypothesis. In trying to decide between the two hypotheses, one course is to examine overall differences in the findings. A series of Bonferroni corrected t -tests were run on each of the Passion, Intimacy, and Commitment variables, using the study as the grouping variable. No significant differences emerged; this was also true when the three dimensions were combined into the superordinate variable, Environmental Love. Thus, it seems that the method employed in each study had little effect on how the general population responded. While this does not eliminate the possibility that interviews and self-reports elicited different responses from Novices and Old-Hands, it does strengthen the argument that another factor, other than method, is at work.

The two studies were conducted using populations that were similar in mean age and in relative number of Novices and Old-Hands, but differed in the proportion of men to women and, to a large degree, the referent area (in Study 1, most respondents discussed the Antarctic; in Study 2, the area was exclusively the Arctic). The lack of significant differences between the sexes within each study suggests that the differences between the two studies are not due to the

fact that one study had more women or men. The influence of referent site is more difficult to rule out, even though the analysis of polar influences carried out in Study 1 would lead one to believe that the polar region in which one was traveling or working would not be a considerable factor. However, the findings of the exploratory analysis in Study 2 indicated that the type of site one had most recently occupied affected the way in which one felt about the circumpolar region. As discussed above, there are a number of differences between field camps and base camps, most of which can be categorized as the differences between a wilderness setting (field camp) and a non-wilderness setting (base camp).

Keeping this in mind, we note that the preponderance of Antarctic personnel came from McMurdo Station, a base of operations that has been described by several of our interview respondents as resembling a "small ugly industrial town with a spectacular view". There is no doubt that this dichotomy, in concert with the limits placed upon their outdoor activities due to safety rules, frustrated and irritated many of our respondents from McMurdo. In a number of interviews, it seemed as if the respondents felt as if they were being treated like children in a candy store: Look, but don't touch. In the Arctic sample, on the other hand, fully sixty-three percent of our respondents (the field camp personnel) were not only in the candy store, they were behind the counters and diving head-first into the bins.

Experience plays a role in this proposed linkage between type of environment and the love shown for it. In Study 1, Novices (eighty-two percent of whom were from McMurdo) were rated as having the greater love of the polar region; in Study 2, the greater love was shown by experienced field camp personnel. If we posit that the primary reason for most sojourners to travel to the polar regions is to experience the natural and untrammelled polar wilderness [one of the commonly perceived "affordances" (Gibson, 1966, 1979) of the circumpolar regions], then the reason for the different patterns of findings across Studies 1 and 2 becomes clear. Novices in the Antarctic, like the Novices in High Arctic base camp, have not had time to become unhappy about their inability to get out of town. Many of them, one suspects, hold that what they are experiencing is "the Arctic/Antarctic". Old-Hands know better: Those who are in McMurdo,

like those in Resolute, realize that they are insulated from the polar region and this leads to much lower ratings of love for the area.

As a brief but important aside, one sees that the least comfortable environment (the field camp) is also the one that engenders the greatest love. This offers a strong argument for re-interpreting supposedly "stressful" environments as challenging or, at the very least, giving consideration to the fact that places such as polar environments are not completely dominated by unrelentingly harmful features.

One other explanation exists for the stronger environmental love shown by Antarctic Novices. Even beyond the sense of wilderness, there is a sense of adventure in traveling to the Antarctic from the northern hemisphere. This is less so when one heads to the High Arctic from North America. The feeling that one is taking a "risk" or doing something quite out of the ordinary may elevate the excitement of the experience and stoke one's passion for the place; this venturesome aspect would be reduced in Old-Hands as they learned that the riskiest parts of a season in McMurdo are probably the flights in and out on the U.S. Navy's aging Hercules aircraft.

The explicit test of the two-dimensional passionate-to-companionate progression of environmental relationships, using the passion vertex and a composite of the intimacy and commitment vertices, showed exactly the same differences between the two studies as did the three-dimensional model. In Study 1, Novices and Old-Hands differed reliably on the two factors, whereas in Study 2 no such distinction was found. This was not entirely unexpected, given that the Companionate variable was built from the two variables weakest in distinguishing the Novices and Old-Hands, but the two-factor model currently appears to be the dominant theoretical approach in interpersonal relationship process research and it was felt that, as such, it needed to be tested. In addition, the possibility existed that the reduction from three dimensions to two dimensions might add to the power of the model to trace the course of the environmental relationship. As it turned out, there is no further need to explain these results, as the reasons outlined and discussed for the three-dimensional model suffice for the two-dimensional model.

Future Directions

The research described above was intended to be a first look at applying a theoretical model drawn from close interpersonal relationship research to the phenomenon of the environmental relationship. The utility of this approach was supported throughout the research, and a number of interesting findings have been discussed. There remains, however, much room for future research.

The research has shown that, within polar settings, environmental relationships are primarily monolithic in structure and positive in valence. The three-factor "triangular" model of interpersonal love described by Sternberg (1988a, 1998b), when translated into the person-environment domain, apparently suffers from the same interdependence of vertices that proved to be the case in the interpersonal domain. While this research questions the *general* nature of the triangular theory with respect to environmental love (i.e., it clearly does not apply to *all* settings), the possibility remains that the three dimensions characterize environmental relationships for other, perhaps more mundane, settings. The fact that the three dimensions do not seem to apply orthogonally to polar regions does not, of course, rule out their usefulness or applicability in other environments.

The polar environment was chosen as the study site partially because it represented a challenging environment. It was felt that the environmental relationship would likely reach its extremes in such a setting, and thus one could tap the full range of feelings produced by a place. What was found in the data was quite a surprise in this respect: There was an abundance of positive feelings about the areas and little evidence to suggest that negative relationships with the environments are extant. This is not to say that unhappy sojourners are non-existent. A paucity of unhappy sojourners in the data does not mean that negative relationships do not develop, only that they were not evident in these studies. In truth, the special nature of the region probably limited the sample in such a manner that positive feelings were over-represented. Other types of places, less adventurous, less difficult and perhaps more stable in

residency, may show a more balanced range of relationships; in such cases, the three dimensions may be in greater evidence.

One of the main problems to be addressed, if one decides to continue with a multi-component model, is the definition of the intimacy dimension. The comments of the interview raters in the first study suggest that the intimacy scale may itself be made up of two (or more) sub-factors. These appear to be most closely described as *caring* and *depth of knowledge*; to a certain extent, the factor also resembles similar elements incorporated in social penetration theory (Altman & Taylor, 1973). This four-factor model (passion, caring, knowledge about the other, and commitment) would address some of the definitional problems encountered in this research and is likely to improve the ability of the model to describe the feelings of the sojourner. Given the interdependence of the three factors shown in this study, it remains questionable as to whether staying with the multi-component model is a profitable course of action. It seems that a wiser plan would be to re-define environmental love as a single construct, one which includes aspects of intimacy and commitment but stresses passion for place as its strongest element.

The measurement of the environmental relationship was undertaken in this research using two different approaches but essentially the same rating scheme. Other techniques may prove just as, or even more, appropriate in different settings. A series of forced-choice questions, based on the three dimensions and delivered to the respondent in a survey-style instrument, would be easier to employ in settings that have no central researcher-resident contact point. Such an instrument would also be closer to the type used by Sternberg and others, although given the criticism that the STLS scale has received, the benefits of replicating Sternberg's methodology are debatable. What is certain is that the environmental relationship, like all relationships that permeate one's life, needs to be assessed using multiple methods and a variety of measurement tools (Altman & Low, 1992).

For reasons outlined in the general discussion above, one of the methodologies that should be utilized as soon as possible is the longitudinal study. Cross-sectional work can be carried out while the longer duration project is under way, but the information that would be

acquired in longitudinal work would go far in delineating the growth and possible decline of environmental love. It would also address questions surrounding the impact of the loss of a place to which one has become attached, as well as potential psychological benefits to having such a place remain intact. The feelings of non-returners, and the reasons they choose to stay in the temperate zones, would provide a much-needed contrast to the Old-Hands; if nothing else, they would provide answers to the problem of the age cohort alternative hypothesis.

This research did not attempt to address the influence of the social environment on the love of place. This was a deliberate strategy, adopted for two reasons: first, the logistical considerations in carrying out both sides of such a study would have made the research very nearly impractical in the time allotted to the project; and second, it was felt that a simple translation of the interpersonal literature into the person-environment domain needed to be examined before the model was made more complex by introducing the social element. However, few environmental psychologists would argue that the influences of the social environment and the physical environment are not completely intertwined. The embedded nature of social and physical features has only recently, with the advent of the so-called "transactional" movement (Altman & Rogoff, 1987; Stokols, 1987; Stokols & Shumaker, 1981), become a central concern in environmental psychology. The methodology needed to employ a transactional approach remains difficult at best, and the philosophical problem the transactionalist world view raises in regards to scientific prediction (essentially disallowing it) is a cause for some concern, but social and physical features of a setting nonetheless need to be examined together if we are to understand the person-place relationship fully. There is perhaps no setting where this is more critical than in a place where several people are isolated together for long durations (Altman, 1973; Sells, 1973; Suedfeld, 1987).

Moving from the interpersonal to the individual as the focus of study, the interviews conducted in Study 1 yielded much in the way of illuminating information that had not been at the center of the research plan. Most of these data will be analyzed in future work, but perhaps one of the most interesting linkages uncovered is the association of self-identity and the polar

regions. A small number of our respondents indicated that they would identify themselves very strongly as "polar people". This sort of person is recognized in the common vernacular of station life in McMurdo. There is a special class of people referred to as the "polar homeless", a group that does not maintain a residence anywhere else in the world but, instead, travels from place to place during seasons away from the station. There are similar people in the High Arctic, although they are much more rare than in the Antarctic. Such people show a place-identity (Proshansky et al, 1983) strongly connected to the polar regions and, one suspects, at least as strong as most people's connection to their home neighbourhood. This melding of self-identity and geographic location was picked up indirectly in the Intimacy vertex definition but, given the strength of self-identity and the lengths one will go to protect and maintain it (see, e.g., Greenwald, 1980), it is likely that place-identity alone would be a strong predictor of love of the polar environment.

To the person unfamiliar with the polar environment, the love of such a place may seem counterintuitive. The regions are, after all, generally regarded as some of the most physically challenging in the world. For many sojourners, this turns out to be the truth; sitting around a coffee table in base camp, one hears stories of polar bears, frost bite, blizzards that last for days, mud that is knee-deep, and weather that turned out to be incessantly bad. The fact that Nature is still quite beyond our ability to tame is a thought that is never far from the wise polar sojourner's mind. As Tuan (1974) has succinctly stated, "certain aspects of nature defy easy human control" (see, e.g., Shackleton, 1919/1983). This is particularly the case in polar regions. Anyone who doubts this need only experience being unsheltered in the face of a full-blown Antarctic blizzard.

The top of the [tent] door opened in little slits and that green Willesden canvas flapped into hundreds of little fragments in fewer seconds than it takes to read this. The uproar of it all was indescribable. Even above the savage thunder of that great wind on the mountain came the lash of the canvas as it was whipped to little tiny strips...Storm force is force 11, and force 12 is the biggest wind

which can be logged: Bowers logged it at force 11, but he was always so afraid of overestimating that he was inclined to underrate. I think it was blowing a full hurricane. (Cherry-Garrard, 1922/1989, pp. 329-332)

It is rare to encounter someone who has experienced a completely terrible season, however, and the "horror stories" are just as often interspersed with tales of coming across a hitherto unknown vista, of the joys of complete and utter solitude, and of the delight one experienced in seeing a herd of muskoxen or a line of penguins. This mix of pleasure, hardship, and powerlessness is similar to a theoretical explanation of continuing abusive relationships, proposed by Dutton and Painter (1981), and recently expanded by Dutton (1988). This explanation has been labeled the "Traumatic Bonding Model". Such a model may be useful when conducting research into that very small sub-population of polar sojourners who return to the region despite previously unpleasant or distressing experiences.

To end on a positive note, the results of this research have shown that the polar sojourner is generally happy in the polar environment, whether that sojourner is new to the region or an experienced Arctic or Antarctic traveler. This stands in stark contrast to the traditional, "polar-life-is-Hell" attitude that has been propagated throughout the polar literature, in both the popular and scientific realms. For many reasons (the need to believe in heroic adventures and fabled lands, a low regard for the strength of the human being, and the exaggerations of the press), the polar regions have always been seen by those with no direct knowledge of the areas as places of impossibilities, an experience designed to bring forth all our psychological demons. Happily, for those of us who do not have a vested interest in seeing the worst in people, this view is a myth. Polar sojourners not only overcome these demons; if they meet them at all, they seem to cherish and benefit from the task.

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Appendices

Appendix 1: Statement of Rights and Privileges

This interview is about how you feel about Antarctica. I'm hoping to trace the growth of those feelings and what plays into your general opinion of the place now. You should know that by taking part in this interview, you do agree to be a respondent in our study.

You should know that this is voluntary; you shouldn't feel any pressure to be here. It's also anonymous and confidential...what that means is that you're assigned an ID for the tape and no individual information gets back to NSF [National Science Foundation], ASA [Antarctic Support Associates], NSFA [Naval Support Forces Antarctica], or any of the other parent organizations. The only people that will see that are the research team, which includes myself, perhaps the head of the Project, Peter Suedfeld, the transcriber, and from one to three coders.

You have the right to withdraw from the interview at any time without explanation, and also you have the right to refuse to answer any particular question without an explanation. Because we are taping this interview, you also may ask me to destroy any or all of the information you give me today, either right after the interview or at any time in the future. You can write to me in care of the department of psychology at the University of British Columbia if you wish to exercise that option at a later time.

Do you have any questions so far? [If the respondent had questions, they were dealt with at this time]. OK, feel free to stop and ask me to clear up anything as we proceed. First off...[go to first question].

Appendix 2: Judge's Package

***Environmental Relationships:
Judge's Package***

The following scale definitions are based on (and expands) Sternberg's triangular model of interpersonal love. As the label suggests, there are three vertices to Sternberg's model: passion, intimacy, and decision/commitment. The modified version includes the opposites of these three vertices: coldness, distance, and indifference.

Please read the vertex descriptions in this package, then use them to make your ratings on the rating sheet(s) provided. A tip: It may prove helpful to refer back to the *brief descriptions* periodically, as these will give you a quick reminder of the meaning of the vertex.

Vertex: Passion

Synonym(s): Arousal; excitement

Brief Description: Motive force; expression of desire and needs

Extended Description: In environmental relationships, passion may show up as love of adventure, need for money, a sense of "who I am", and similar rationale. It is the excitement, or lack of it, that is brought about by being in a specific place. This arousal is usually expressed as a physical excitement, but it can also take the form of a more "spiritual" revelation: e.g., a person who is passionate about a site might feel a profound sense of wonder, harmony with the place, or expanded grasp of their position in the universe. Note that the opposite of passion is dispassion, not disliking: This means that the person expresses such sentiments as boredom, lack of interest or enthusiasm, and/or a pronounced lack of reaction when asked about their feelings.

Actions related to greater passion: enthusiastic comments related to "liking" (mild passion) or "loving" (more intense passion) a place, either for its scenery or for the actions it affords the person (e.g., mountain-climbing, skiing, walking around); expressions dealing with the romance of adventure; expressions of excitement caused by features of the environment; comments about the spiritual side of the environment, or the spiritual effect it has on the person.

Actions related to greater coldness: comments about being "bored" or disinterested by the place; lack of enthusiasm for either specific or general features of the environment; sleepiness or lethargy attributable to lack of interest in the environment; signs of "just going through the paces".

Prototypical examples of the passion vertex:

Score of -4: "No, there's nothing very inspiring about being here. In fact, beyond the Herc flight in, I've been quite bored by the whole thing. Nothing ever really seems to happen here; it's like everyone is walking around just waiting to get back home. Or maybe its just me."

Score of -2: "Besides the occasional storm, there isn't a whole lot here to rev up a person. It sure ain't as exciting as I thought it was going to be. I wish there was more going on. I just seem to hibernate all the time."

Score of +2: "I hadn't actually ever thought of going to the Antarctic before the job came up. I still find it weird that I'm here...can't quite get used to it. I like it here OK, and I feel good about coming here...that part about being here still surprises me."

Score of +4: "Yeah, I get out whenever I can...its been three months and I must have skied the Castle Rock trail a dozen times. I love it here. I remember one time sitting out on Obs Hill it was around two o'clock in the morning and the sun was still way up there. Looking out over the Royals, I felt like this tiny speck in a huge place; it was a great feeling."

Vertex: Intimacy

Synonym(s): Involvement

Brief Description: Connectedness, bonding, or closeness

Extended Description: Intimacy is characterized by a number of different elements: care and promotion of the environment's welfare, understanding and support of the environment's "needs", respect for the environment, trust (a sense that one can depend on the environment, particularly in times of need), and a recognition or expressed feeling of interdependence with the place (in other words, a belief that the respondent and place are somehow tied together, particularly in a spiritual sense). In interpersonal relationships, intimacy can be described as an opening up of two people to one another. It goes beyond the simple act of mutual self-disclosure and can be scored as the depth of knowledge each partner has of the other. In environmental relationships, intimacy is the degree of active involvement with the environment. Involvement, in this case, includes both overt behaviour or covert thoughts; it also includes the knowledge gained by the respondent through his or her exploration of, passage through, or manipulation of, the environment.

Actions related to greater intimacy: active or supportive behaviours having to do with maintenance of the environment (e.g., clean-up of litter, beautification projects); expressions and behaviours indicative of a familiarity with a place; comments related to the intertwining of self and place, and most specifically the impact on the individual of having to leave a place.

Actions related to greater distance: clear separation of self and place, often on purpose; lack of knowledge about the environment; actions that indicate avoidance of exploration; lack of concern or knowledge about the consequences of one's actions with respect to the place; statements in which the place is seen as "common" or "nothing special" (i.e., lack of distinctiveness).

Prototypical examples of the intimacy vertex:

Score of -4: "Can't see why people bother coming here...nothing special about this place at all. Of course, it isn't like I get out much; I suppose I could get out more often, but that stuff honestly doesn't do a whole lot for me...I'd just as soon read a book...besides, I don't really trust this place at all."

Score of -2: "Mostly I go to work, then either to my room or one of the bars. If its bowling night, I'll be there. Actually, its just about the same as being at home. Nice comfortable life, though I'm looking forward to seeing green grass again."

Score of +2: "I read a little bit about this place before I got here, so nothing came as a total surprise. There were a few things, like the wind always blowing. Hm...funny how this place can get under your skin; I guess I never really thought of myself as a cold weather person before this."

Score of +4: "Um, I try to get involved in as many different activities as possible; so far it's got me out of town quite a bit, especially the search and rescue stuff. You get a whole new appreciation for how fast this place can kill you when you're hanging upside-down in a crevasse...I'm really going to miss it when I go home."

Vertex: Decision/commitment

Synonym(s): Choice

Brief Description: (short-term) decision to love; (long-term) commitment to maintaining the relationship

Extended Description: The brief description pretty much sums up the concept of decision/commitment. A point to remember about this vertex is that it has two components: the immediate decision to like or love; and the prolonged action and intention of staying in the place. An example of high commitment occurs when a person elects to stay in a place despite costs (financial, psychological, physical, or otherwise) to that person.

Actions related to greater commitment: certainty about one's remaining in a place through difficult times (does not include being forced to stay because of circumstances); effort expended in order to return to, or remain in, a place; returning to a place several times by choice.

Actions related to greater indifference: willingness to leave with little reason given; desire to "see other places"; statements having to do with being unsure how one feels about a place;

Prototypical examples of the commitment vertex:

Score of -4: "How do I feel about this place? Geez, get me a plane ticket and I'll show you. This place can take the express lane to Hades as far as I'm concerned. I've seen every nook and cranny, and there isn't enough money in the world to keep me here."

Score of -2: "It's just a place, you know, another work site, not even the coldest place I've been. If things weren't so damn slow at home, I probably wouldn't be here. I think everyone should at least get a chance to see something like this once, though; it's worth visiting at least once, and knowing about."

Score of +2: "This is my second time here, and it will probably be my last. I'd like to come back, but its been pretty tough on the family life, my being here. Hope nothing happens to spoil the area; it would be a shame to see it ruined by greed. I may even get involved in one of those tree-hugger groups at home just so I can keep tabs on it."

Score of +4: "You know, I just don't know how I'm going to be able to get on that C-130 tomorrow. Even though I've had a few wars with people down here, and it can get truly lonely at times, I expect I'll be back down again in year or two, as I can't really see my self staying away. Yeah, I'll be back, if only to make sure they clean up that garbage dump."

Respondent's ID: _____ Rater: _____

Before you begin to read this transcription, take a moment to review the definitions on the attached sheets. Try to keep in mind that the vertices in this study refer to feelings about a place; as much as possible, try to separate feelings specifically about people out of your judgment. If statements include people as being part of the place, they may be included in your assessment.

Read the entire transcription and then circle a score between -4 and +4 for each of the three vertices. It may prove helpful to go back and read the prototypical statements provided at the end of each vertex description. If there seems to be no evidence of the vertex anywhere in the respondent's material, circle the 0 in the center of the scale. If you cannot decide on a score, leave the scale for that vertex empty and circle the "Can't decide" below it. Please give some extra thought to a score before choosing this last option.

Passion:

-4	-3	-2	-1	0	+1	+2	+3	+4
Very Cold		Fairly Cold		Vertex not Present		Fairly Passionate		Very Passionate
(Can't decide)								

Intimacy:

-4	-3	-2	-1	0	+1	+2	+3	+4
Very Distant		Fairly Distant		Vertex not Present		Fairly Intimate		Very Intimate
(Can't decide)								

Commitment:

-4	-3	-2	-1	0	+1	+2	+3	+4
Very Indifferent		Fairly Indifferent		Vertex not Present		Fairly Committed		Very Committed
(Can't decide)								

Appendix 3: PIC Form (Self-rating)

Instructions

This scale measures how you feel about being in the High Arctic; it should take no more than fifteen minutes to fill out.

Please note that this scale is confidential and anonymous; do not put your name on any of these sheets. ID's have been stamped on the sheets in case they become separated during transit. Participation is absolutely voluntary, and you may take this form without feeling any obligation to complete and/or return it.

Complete this form by reading the descriptions of each of the three scales, then put a circle around the level that best corresponds to how you would rate yourself according to the scale description.

As part of the project, we are looking at the differences between scores you give yourself and scores assigned by someone else. Please give the sheets marked "Collateral's Ratings" to a person that has spent time with you here in the Arctic and would know how you feel about the area. Ask them to complete the ratings separately and return them as per the instructions below.

Return the completed form either directly to me or to the box I have left out in the main TV/pool room of the PCSP residence building. After doing this, you can see me for an information sheet that more fully describes the study and its goals.

By completing and returning this form, you agree to let us use your responses, averaged with others, in our study. These averages and other group statistics may then be reported in academic forums and journals. At no time will an individual's results be available to anyone other than myself.

Read the scale descriptions carefully; if you have any questions, please see me and I will be more than happy to answer them. If you wish to contact me or my advisor (Dr. Peter Suedfeld, the head of this project), you may write to either of us at the address at the top of this page.

Thanks for your help.

Gary Steel

THE PIC FORM IS DOUBLE-SIDED; PLEASE MAKE SURE YOU FILL IN BOTH SIDES.

The *Pas* scale:

Description: The *Pas* scale represents the excitement or boredom that is brought about by being in a specific place (in this case, the Arctic).

Actions typical of higher amounts of *Pas*: enthusiastic comments related to "liking" or "loving" this area,; feelings expressed dealing with the romance of adventure; excitement inspired by features of the environment; and/or comments about the spiritual side of the environment, or the spiritual effect it has on you.

Actions typical of lower amounts of *Pas*: feelings of being "bored" or disinterested by the place; lack of enthusiasm for either specific or general features of the environment; sleepiness or lethargy due to lack of interest in the area; and/or signs of "just going through the paces".

I WOULD RATE MYSELF (circle one):

Very low	Somewhat low	Neither high nor low	Somewhat high	Very high
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ON AMOUNT OF *PAS* FOR THE HIGH ARCTIC.

PLEASE TURN THE SHEET OVER →

The *Int* scale:

Description: The *Int* scale is characterized by a number of different elements:

- caring about what the area
- understanding and support of the High Arctic's special ecology
- respect for the environment
- a sense that you can depend on the environment
- your depth of knowledge of the area
- a feeling that you and the place somehow belong together.

Actions typical of higher amounts of *Int*: active or supportive behaviours having to do with maintenance or preservation of the area; familiarity with the place; and/or comments that show a connection between you and this place; and most specifically the impact on the individual of having to leave a place, possibly for good.

Actions typical of lower amounts of *Int*: clear separation, in your mind, of you and this place; little knowledge about the High Arctic, including its history, geography, politics, etc.; staying inside (versus going outside and exploring, when you have a choice); not too much concern over the physical impact on the land of our presence; statements in which you might have described the area as "common" or "nothing special".

I WOULD RATE MYSELF (circle one):

Very low	Somewhat low	Neither high nor low	Somewhat high	Very high
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ON AMOUNT OF *INT* FOR THE HIGH ARCTIC.

PLEASE TURN THE SHEET OVER →

The *Com* scale:

Description: The *Com* scale measures the state of your feelings about the Arctic. Have you decided how you feel about the area and, if so, would this feeling cause you to stay (or leave) the Arctic? An example of a high amount of *Com* is how a person might feel about one's hometown; a low amount would be shown by a person who is "just passing through" the same place.

Actions typical of higher amounts of *Com*: being very certain about wanting to remain here even through difficult times; an effort being made in order to return to the area; returning to a place several times by choice.

Actions typical of lower amounts of *Com*: willingness to leave with little or no reason given; desire to "see other places", or to escape this place; statements having to do with being unsure how one feels about a place.

I WOULD RATE MYSELF (circle one):

Very low	Somewhat low	Neither high nor low	Somewhat high	Very high
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ON AMOUNT OF *COM* FOR THE HIGH ARCTIC.

Appendix 4: PIC Form (Collateral rating)

Collateral ratings

Instructions to the rater:

The person who asked you to complete these sheets is kindly taking part in a study conducted by Gary Steel, from the University of British Columbia. This form deals with feelings about being in the High Arctic. It should take no more than fifteen minutes to complete.

Part of this project deals with the differences between the scores a person gives him or herself and the scores assigned by someone else. This is why you have been asked to fill out this sheet.

Please note that this scale is confidential and anonymous; do not put your name on any of these sheets. ID's have been stamped on the sheets in case they become separated during transit. Participation is absolutely voluntary, and you may take this form without feeling any obligation to complete and/or return it.

Complete this form by reading the descriptions of each of the three scales, then put a circle around the level that best corresponds to how you would rate the subject according to the scale description.

Return the completed form either directly to me or to the box I have left in the main TV/pool room of the PCSP residence building. After doing this, you can see me for an information sheet that more fully describes the study and its goals.

By completing and returning this form, you agree to let us use your responses, averaged with others, in our study. These averages and other aggregate statistics may then be reported in academic forums and journals. At no time will the individual results you give me be available to anyone other than myself.

Read the scale descriptions carefully; if you have any questions, please see me and I will be more than happy to answer them. If you wish to contact me or my advisor (Dr. Peter Suedfeld, the head of this project), feel free to write to either of us in care of the address at the top of this page.

Thanks for your help.

Gary Steel

THE PIC FORM IS DOUBLE-SIDED; PLEASE MAKE SURE YOU FILL IN BOTH SIDES.

The PIC Form

1. How well would you say you know the subject?

1	2	3	4	5	6	7
Hardly at all	Somewhat		Quite well			Very well

2. How long have you known the subject?

_____ yrs. _____ months

The *Pas* scale:

Description: The *Pas* scale represents the excitement or boredom that is brought about by being in a specific place (in this case, the Arctic).

Actions typical of higher amounts of *Pas*: enthusiastic comments related to "liking" or "loving" this area,; feelings expressed dealing with the romance of adventure; excitement inspired by features of the environment; and/or comments about the spiritual side of the environment, or the spiritual effect it has on the person.

Actions typical of lower amounts of *Pas*: comments about being "bored" or disinterested by the place; lack of enthusiasm for either specific or general features of the environment; sleepiness or lethargy due to lack of interest in the area; signs of "just going through the paces".

I WOULD RATE THE SUBJECT (circle one):

Very low	Somewhat low	Neither high nor low	Somewhat high	Very high
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ON AMOUNT OF *PAS* FOR THE HIGH ARCTIC.

PLEASE TURN THE SHEET OVER →

The *Int* scale:

Description: The *Int* scale is characterized by a number of different elements:

- caring about what the area
- understanding and support of the High Arctic's special ecology
- respect for the environment
- a sense that one can depend on the environment
- the subject's depth of knowledge of the area
- a feeling that the subject and the place somehow belong together.

Actions typical of higher amounts of *Int*: active or supportive behaviours having to do with maintenance or preservation of the area; expressions and behaviours that show a familiarity with a place; comments that show a connection between the subject and this place; and most specifically the impact on the individual of having to leave a place, possibly for good.

Actions typical of lower amounts of *Int*: clear separation of the subject and this place; little knowledge displayed about the High Arctic, including its history, geography, politics, etc.; staying inside (versus going outside and exploring, when the subject has a choice); not too much concern over the physical impact on the land of our presence; statements in which the subject might have described the area as "common" or "nothing special".

I WOULD RATE THE SUBJECT (circle one):

Very low	Somewhat low	Neither high nor low	Somewhat high	Very high
---------------------	-------------------------	---------------------------------	--------------------------	----------------------

ON AMOUNT OF *INT* FOR THE HIGH ARCTIC.

PLEASE TURN THE SHEET OVER →

The *Com* scale:

Description: The *Com* scale basically measures the state of the subject's feelings about the Arctic. Have he/she decided how he or she feels about the area and, if so, would this feeling cause that person to stay (or leave) the Arctic? An example of a high amount of *Com* is how a person might feel about staying in one's hometown; a low amount would be shown by a person who is "just passing through" the same place.

Actions typical of higher amounts of *Com*: being very certain about wanting to remain here even through difficult times; an effort being made in order to return to the area; returning to a place several times by choice.

Actions typical of lower amounts of *Com*: willingness to leave with little or no reason given; and expressed desire to "see other places", or to escape this place; statements having to do with being unsure how he or she feels about the High Arctic.

I WOULD RATE THE SUBJECT (circle one):

Very low	Somewhat low	Neither high nor low	Somewhat high	Very high
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ON AMOUNT OF *COM* FOR THE HIGH ARCTIC.

Appendix 5: Debriefing Form

The Environmental Relationship in Polar Regions

The goal of this study is to examine the structure of people's emotional ties to various sites in the Antarctic and the Canadian High Arctic. The theory that we are testing is based on a three factor model of interpersonal love (Sternberg, 1988).

These three factors are passion, intimacy, and commitment. We have found evidence, during interviews conducted over the last four years in both polar regions, to indicate that these same factors may occur in attachments to a particular site or region.

Drawing on these interviews, we have constructed the PIC form. This form measures the environmental equivalent of passion (*Pas*), intimacy (*Int*), and commitment (*Com*). We will be examining the relationship between these factors. The study will also analyze for differences between "novices" and "old-hands". In addition, the demographic information you gave us will help us determine if there are any age or sex differences along the PIC factors. The occupational and marital status information are to be used to give a summary of the people in the study.

The collateral information was needed in order to determine the validity of using the PIC as a self-report measure. The answers provided by the other rater will be compared to your own in order to examine the relationship between self-ratings and other-ratings.

This study was part of the Polar Psychology Project (PPP), an on-going, multinational, transpolar research program investigating human psychological and psychophysiological functioning in polar areas. Further information about the PPP can be obtained from the Director, Dr. Peter Suedfeld, Department of Psychology, University of British Columbia, Vancouver, B.C., Canada, V6T 1Z4. Logistical support was provided by the Atmospheric Environment Service, the Polar Continental Shelf Program (Project 164-89, P. Suedfeld), the Northern Scientific Training Program (Grant No. A93-0059, G.D. Steel), and the U.S. National Science Foundation (Division of Polar Programs, Grant No. DPP-90-19131, L.A. Palinkas & P. Suedfeld).

Thanks once again for your participation.