

TWO KNOWLEDGE STRUCTURES
NEEDED TO SATISFY THE ATTACHMENT MOTIVE

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Abstract

This dissertation concerns the attachment motive. It presents a theory and empirical data testing hypotheses about the way people obtain support (when desired) from reliable attachment figures. In order to obtain support, a person first needs to identify potentially supportive partners. To do so, the person needs relevant knowledge for predicting whether a potential partner can be counted on to be reliably supportive. The present dissertation examines two relevant types of knowledge structures and provides ways to assess them. The first knowledge structure provides indicators of a potentially supportive partner that should serve as good predictors. In Study 1, I applied the prototype methodology to derive a prototype of indicators that another person can be expected “to be there for me at future times of stress.” Using a false recognition paradigm, I demonstrated that this knowledge affects information processing and constitutes a prototype. I call this kind of knowledge “indicator-knowledge.”

In Study 2, I used these indicators to construct a new type of personality measure that assesses individual differences in knowledge. The measure is called the “Knowledge of Indicators (NOWI) Scale”. It assesses a person’s knowledge of indicators that lead to an expectation that a partner will be there when needed. The NOWI applies signal detection methods to assess each participant’s ability to discriminate good from poor indicators. The resulting index is called the “NOWI-accuracy index.” In Study 3 I showed that the measure predicts performance on a laboratory task: Participants interacted with a confederate who described a personal problem; in describing the problem, the confederate revealed subtle cues that another person could not be counted on for support. Participants with a high NOWI-accuracy index recognized, recalled, and correctly interpreted the cues more readily.

In Study 4, I demonstrated that the KNOWI Scale possesses convergent and discriminant validity.

In addition to the KNOWI-accuracy index, the KNOWI Scale provides a second index, the KNOWI-readiness index, which is the sum of a respondent's ratings across all indicators. I hypothesized that an elevated motive for support leads to a higher KNOWI-readiness index. I call this general effect the ELMO ("elevated motive") effect. Studies 5 and 6 confirmed this hypothesis: KNOWI-readiness correlated with other measures of motivation to connect with others. For generality, Study 7 replicated the ELMO effect using a different motive (the intimacy motive). Then Study 8 used the two KNOWI indices together to test the hypothesis that performance on a relevant laboratory task is a joint function of knowledge and motivation. The results confirmed this hypothesis by showing that superior knowledge led to superior performance only when motivation was high (as assessed in two different ways). Study 9, an experience sampling study, extended the findings to show how the KNOWI Scale predicts behavior in everyday life. Motivated and knowledgeable people more often sought support from partners at times of distress.

Studies 10 and 11 focused on a second knowledge structure, a structure containing script-knowledge. The relevant script was the *secure base script*, which concerns the sequence of events that unfold as a person in distress receives comfort from an attachment figure. Participants were shown animated film clips in which geometric figures depicted the secure base script; the participants were then asked to describe the animations. Participants who recognized the script were more likely to (a) see a common theme in the various animations, (b) later recall details of the animations, (c) include more elements in describing the animations, (d) report details with fewer distortions, and (e) create better organized stories. Thus, recognizing the

secure base script enables a person to process information concerning secure base support and to correctly interpret supportive efforts of relationship partners. Finally, I showed that the two knowledge structures—indicator-knowledge and script-knowledge—are themselves correlated and that attachment avoidance is negatively related to both.

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Chapter 1

Introduction

Attachment theory is based upon the following premise: Throughout life most people seek comfort from an attachment figure at times of stress (Bowlby, 1979). People of all ages are thought to benefit substantially from a close relationship with a sensitive and available partner. I therefore assume that adults, like children, are *motivated* to have one or more significant others who can be counted on to “be there” at times of stress. I call this motive the *fundamental attachment motive*. But what is this motive, and how is it related to other communal motives? Can we measure its strength in a given individual? How do people go about satisfying it? Why are some people better able than others to satisfy the motive? Research is needed to sharpen the mechanisms and develop measures that help clarify the component processes involved in satisfying the fundamental attachment motive. The research reported in the present thesis attempts to address that need by examining two neglected factors that contribute to satisfying the attachment motive. These factors are (a) knowledge about attachment relationships and (b) the strength of the attachment motive itself. In order to assess each of these two factors and demonstrate their importance, I shall also present new methods of assessment that I have constructed and offer some novel theoretical constructs that relate those measures to the fundamental attachment motive.

Theoretical Background

According to Erikson (1950), the earliest developmental challenge for human infants is to develop a sense of trust in other people: The infant needs to know that caregivers will be there to take care of the infant’s basic needs. Bowlby’s attachment theory (1979; Ainsworth, Blehar, Waters, & Wall, 1978) elaborated upon this theme.

It postulated that, when feeling threatened or distressed, children as well as adults seek attachment figures for protection and comfort, using the attachment figure as a “safe haven” and a “secure base.” Sarason, Shearin, Pierce, and Sarason (1987) extended the idea to the effect of social support in adulthood: “The function that social support plays in a young adult and an adult’s life is likely an extension of that played by attachment experiences in infancy” (p. 830).

According to Reis and Shaver’s (1988) model of intimacy (later modified by Reis and Patrick, 1996), a feeling of intimacy is created between two people when one person is responsive to the other person’s self-disclosure or self-expression. Partners are said to be responsive when they “attend to and react supportively to central, core defining features of the self” (Reis, Clark, & Holmes, 2004; p. 203). The term “responsive,” as used by these authors, implies *effective* responsiveness, that is, successfully detecting and providing what the partner needs. Research suggests that social support is most effective when it matches the needs of the careseeker (Horowitz, Krasnoperova, Tatar, Hansen, Person, Galvin, & Nelson; 2001). A responsive partner would know and provide whatever type of support is appropriate—including (when needed) non-interference, backing off, or permitting autonomy.

All of the above theories also emphasize the importance of a person’s *feeling confident* that the partner will be there when needed. According to Erikson (1950), as a result of the parents’ availability and responsiveness to the infant’s needs, the infant acquires a trusting attitude that people, in general, will be there for the infant. This expectation is then carried into subsequent relationships. Similarly, according to Bowlby (1973), “...human beings of all ages are found to be at their happiest and to be able to deploy their talents to best advantage when they are confident that, standing behind them, there are one or more trusted persons who will come to their

aid should difficulties arise” (p. 359). Attachment theory postulates that the caregivers’ responsiveness (availability, sensitivity, respect for the child’s autonomy, and acceptance of his or her individuality) creates an expectation in the child (and later, in the adult) that other people with whom the person becomes intimate will be there when needed.

The social support literature and the literature on partner responsiveness also stress the importance of knowing that other people will be there for the person. In discussing the positive effects of social support, Sarason et al. (1987) write:

It is this feeling—that we are loved and valued, that our well-being is the concern of significant others—that is protective. Yet the main effect of these communicated feelings is not to protect the individual from possible harm *per se*, but to foster in supported individuals the feeling that they are worthwhile, capable, and valued members of a group of individuals and that the resources necessary for the pursuit and achievement of their goals are available to them... (p. 830).

According to Holmes and Rempel (1989), the belief that a partner will be there when needed is at the core of interpersonal trust between close relationship partners. Holmes and Rempel define *trust* as people’s “abstract positive expectation that they can count on a partner to care for them and be responsive to their needs, now and in the future” (p.188). Thus, a person’s perception that a partner is responsive seems to be a major ingredient in the development of trust.

The theoretical approaches summarized above all emphasize a person’s need to know that a responsive partner (an attachment figure) will be available at times of stress and that the person can seek comfort from this attachment figure at those times. However, extant research has not specified mechanisms and component

processes that are needed to make this kind of judgment about attachment figures. In my view, trust, confidence, and expectations are alike in emphasizing *cognitions* based upon *knowledge structures* concerning relationships. Therefore, I assume that knowledge structures required to make this kind of judgment are essential in satisfying the fundamental attachment motive. In addition, the strength of a person's motive for support should also play an important role. In the next section, I shall examine these processes in more detail.

Satisfying the Fundamental Attachment Motive

During infancy (at least initially), the satisfaction of the attachment motive is in the hands of primary caregivers. But later in life, people need to identify sensitive and reliably available attachment figures. How do adults go about identifying potentially supportive attachment figures? What capacities does a person need for identifying such figures and approaching them for support? Why are some people more successful than others in acquiring attachment figures? What limitations leave some people virtually unable to make use of attachment figures? Specific questions like these are important because people who cannot obtain effective support cannot avail themselves of the considerable benefits of social support.

How do people satisfy the fundamental attachment? Satisfying *any* motive requires people to set goals and adopt specific strategies known to be effective in satisfying that motive (Horowitz, Wilson, Turan, Zolotsev, Constantino, & Henderson, 2006). Therefore, a person can satisfy the motive only if the person possesses knowledge about those strategies. In addition, the person has to be motivated; that is, the person has to "care about" identifying attachment figures if the person is to bother applying the knowledge.

In this research I therefore examine the importance of two largely neglected factors—one cognitive, the other motivational—in identifying supportive attachment figures. The cognitive factor concerns one type of *knowledge about people*, namely, good strategies for identifying a supportive partner (Turan & Horowitz, 2007). The motivational factor concerns the *strength* of each person's attachment motive itself (averaged across many situational demands). Why have these two factors been neglected in previous research? One reason is that attachment research does not generally address people's *success* in support exchanges. Logically, success on any task would seem to depend upon the person's (a) having the knowledge needed and (b) having sufficient motivation to carry out the task (Hirschfeld, Lawson, & Mossholder, 2004). A second reason is that very few methods exist for assessing attachment-relevant knowledge and the strength of the attachment motive.

In the following sections, I describe how I have deconstructed the fundamental attachment motive into goals and strategies that are needed to satisfy the motive. Later I will show how these goals and strategies are related both to the necessary knowledge and to the strength of the person's motive—and can therefore be used in assessment.

Hierarchical Structure of Motives

Many writers have proposed that any abstract motive (such as the fundamental attachment motive) may be conceptualized hierarchically (see review by Horowitz, et al., 2006). As one example, consider the intimacy motive: The abstract motive for intimacy subsumes narrower motivational constructs, which subsume still narrower constructs. The term *goal* refers to a very narrow (concrete) level that is associated with a class of specific behaviors. The goals and strategies serving the intimacy motive might include: exchanging private thoughts or feelings with a partner,

helping a partner solve a personal problem, undertaking a physical challenge together with a partner, and so on.

But how can a researcher determine which goals and strategies people use most often to satisfy the fundamental attachment motive? The theory presented here draws upon prototype methodology to identify these goals and strategies (Horowitz & Turan, 2008). I consider a motive such as a desire for attachment figures to be an abstract concept with many associations. Because adults have a personal history of experiences satisfying the motive, their *associations* to the motive generally include goals and strategies that they have found effective in the past for satisfying the motive.

Operationalizing the Knowledge Needed to Satisfy the Attachment Motive

I shall define a *prototype* of a motive as a particular type of knowledge structure of associations to the motive (Horowitz & Turan, 2008). One prototype of *intimacy*, for example, would be “*good ways to attain intimacy*.” Other prototypes of *intimacy* would include, “*characteristics of people who are open to intimacy*” and “*situations that lead to a feeling of intimacy*.” To generate a prototype, one needs two large groups of informants: nominators and raters. To derive the prototype “*good ways to attain intimacy*”, nominators generate as many good ways to attain intimacy as they can. Then raters rate the quality of each nominated element, and the ratings of each element are averaged. The prototype is the resulting list of elements (“*good ways to attain intimacy*”), ordered according to their mean ratings.

Similarly, the ways people satisfy the fundamental attachment motive may also be revealed using prototype methodology. To satisfy this motive, a person needs to satisfy relevant goals such as “*identifying persons who are apt to be a supportive attachment figure*”. To satisfy *that* goal, I argue that a person can make

use of the prototype of "indicators of a supportive person" (if it is known to the person). I therefore used prototype methodology to identify the indicators of a supportive attachment figure. As I shall show in later chapters, this prototype may then be applied to assess (a) the person's degree of knowledge and, perhaps surprisingly, (b) the strength of the motive in that person.

Two Important Factors in Identifying a Supportive Attachment Figure

Factor 1: Attachment-relevant knowledge. According to my theory, one necessary, but not sufficient, requirement involves knowledge about supportive attachment figures. Suppose Mary is developing a romantic relationship with John. Mary may wonder whether John will be there for her at times of stress. Does Mary have to wait until she experiences serious distress in order to find out whether John will be there for her? The notion of *indicator knowledge* is based on the assumption that she does not: She can make use of the known "indicators of a supportive attachment figure" to predict whether John will be there for her in the future when she needs support.

Therefore, using the prototype methodology, I identified the indicators people use to predict whether a potential partner is apt to be there when needed. Then, I examined the structure and organization of this knowledge structure, and showed that this knowledge structure affects how people process attachment-relevant information.

Finally, using this prototype, I developed a task to measure *individual differences* in possessing indicator-knowledge needed to discriminate good from poor indicators. The KNOWI (Knowledge of Indicators) Task contains a mixture of highly informative and less informative indicators, and respondents are asked to judge the informativeness of each. Participants are said to be more knowledgeable if they are better able to discriminate between good and not-so-good indicators.

This view of the process of identifying a supportive attachment figure may be regarded as an application of the lens model of accurate person perception (Brunswik, 1956). That is, valid cues exist and these cues are used by the perceiver.

Factor 2: Strength of the attachment motive itself. I assume that most people are energized, at least to some extent, by a fundamental attachment motive. However, my theory assumes that on average across situations, people differ in the strength or intensity of any interpersonal motive (Horowitz et al., 2006). A relatively strong attachment motive would also seem to be necessary—but not sufficient—for success in identifying good attachment figures. Without sufficient motivation, a person would have little reason to care about identifying attachment figures—and therefore would not direct attention to, apply resources to, or devote energy to the task. In selecting friends and romantic partners, for example, the person's behavior might be energized and directed, not by the attachment motive, but by some other motive unrelated to support.

How can the strength of a person's attachment motive be assessed objectively? One possibility would be to use a self-report measure of communal motivation. In the theory that I develop, I assume that the fundamental attachment motive subsumes a motive for interpersonal support. One easily administered measure of the strength of this motive is Locke's Circumplex Scale of Interpersonal Values (CSIV; 2000). Thus, a person's *degree of knowledge* can be assessed by the KNOWI Task; and the person's *strength of the motive* for attachment figures can be assessed by Locke's CSIV.

Prototype ratings as an implicit measure of motive strength. I shall also hypothesize (and demonstrate) that an alternate (non-self-report) measure of motive strength may be obtained from the person's ratings of all indicators. Consider the

intimacy motive again: Imagine a person with a strong intimacy motive, who was asked to rate elements of some prototype of *intimacy*—e.g., *good ways to attain* intimacy. In the past, a person with a strong motive would have often been energized and directed by the intimacy motive. Over the years such people would have discovered many opportunities for intimacy: They would have detected cues that direct their attention to opportunities for intimacy and would have used a variety of strategies for satisfying the motive. Therefore, highly motivated people would have accumulated a substantial backlog of experiences related to intimacy—and, because of their familiarity with many ways of attaining intimacy, they would have recalled them positively (Matlin & Stang, 1978). Then, when shown a list of strategies for attaining intimacy, they should readily recognize many strategies in the list (good as well as not-so-good) as familiar from their own experience. When asked to rate the quality of these strategies, highly motivated people—having already tried many strategies with success—would, on average, produce higher ratings than other people (see Unkelbach, 2007, for the relationship between familiarity and judgments).

I therefore propose that prototypicality ratings may be used to assess the strength of a motive. That is, an elevated *motive* should lead to elevated *ratings* across all indicators, on average. I shall call this hypothesis the elevated motives (*ELMO*) *effect* and will provide two demonstrations of the ELMO effect. Other literature in cognitive psychology and social cognition that is related to this effect will be described in the General Discussion.

The KNOWI task requires respondents to discriminate between high-quality and low-quality indicators of a good attachment figure and therefore resembles a signal detection task. Signal detection theory (Green, & Swets, 1966; Macmillan & Creelman, 1991; McNicol, 1972) was designed to clarify a person's ability to

discriminate a “signal” from some background “noise” (e.g., the presence vs. absence of a tone). By analogy, high-quality indicators of the KNOWI Task might be regarded as “signal” and low-quality indicators as “noise”. According to signal detection theory, four outcomes are possible: The stimulus may be: (a) correctly judged to be present (*hit*); (b) incorrectly judged to be present (*false alarm*); (c) correctly judged to be absent (*correct rejection*), and (d) incorrectly judged to be absent (*miss*).

Signal detection theory proposes that two factors influence people’s judgments in situations involving this kind of uncertainty: (a) *accuracy* and (b) *criterion bias*. Accuracy (or sensitivity) refers to the person’s ability to make distinctions between signal and background. It may be assessed simply by the number of hits *minus* the number of false alarms. In the same way, the KNOWI Task assesses a person’s knowledge of indicators on the KNOWI Task by computing the person’s mean rating of high-quality indicators (“hits”) minus the person’s mean rating of low-quality indicators (“false alarms”). I shall call this index the *KNOWI-accuracy*.

The other index of signal detection theory, namely, the criterion bias, is a motivational variable and reflects the person’s readiness (across all stimuli) to judge a signal to be present. On the KNOWI Task I assume, by the ELMO effect, that some people—those who are more highly motivated, hence more familiar with indicators of a good attachment figure—have a readiness to judge all “signals” (indicators) relatively higher in quality. To avoid the negative connotation of the term “criterion bias,” I shall use the term *response readiness* for the KNOWI Task. Just as the criterion bias of signal detection theory may be assessed by the number of hits *plus* the number of false alarms, the KNOWI Task provides a simple index of *response readiness*—namely, the sum of *all* ratings (high-quality *plus* low-quality indicators). I shall call this index the *KNOWI-readiness*.

Another(Related) Knowledge Structure

In my view, the knowledge of valid indicators of a potential partner's supportiveness is part of a broader set of knowledge structures that help a person to process attachment-relevant information. What other types of knowledge might be relevant? Fehr (2004) has argued, "to know the meaning of a word... is to know a script in which events unfold in a particular sequence" (p. 193). As another knowledge structure, this thesis examines the availability and accessibility of the "secure base script" (Waters, H. S., & Waters, E., 2006). The secure base script articulates the specific steps involved when an attachment figure provides care, comfort, and support to a distressed partner.

The Secure Base Script

Schank and Abelson (1977; Abelson, 1981; Schank, 1999) developed the notion of a *script* as a type of knowledge structure that helps people to mentally represent prototypic event sequences. The main characteristic that distinguishes scripts from other knowledge structures formulated by cognitive psychologists is that scripts represent the temporal order of events (Abelson, 1981). The restaurant script, for example, lists the order of events when one eats at a restaurant.

H. S. Waters and E. Waters (2006) have applied the notion of a script to attachment relationships and formulated the secure base script. The secure base script concerns the prototypic sequence of events in an interaction between two people, in which one helps allay the distress of the other and enables the distressed person to return to non-distress activities. Theoretically, the script applies equally well to child-adult relationships and to relationships between two adults where one serves as a secure base for the other. The secure base script contains the following components (or sequence of events): (a) Two partners are engaged in an activity

(either together or separately). (b) One person shows signs of distress and (c) asks for help. (d) The partner notices the distress, (e) helps solve the problem, and (f) comforts the person, so that (g) the once-distressed person can now return to normal activities. I shall demonstrate that people differ in how readily they recognize this script.

Having Ready Access to the Secure Base Script. Baldwin, Keelan, Fehr, Enns, and Koh-Rangarajoo (1996) suggested that social-cognitive theory and associated methods may help us understand attachment processes. These researchers showed that there are individual differences in the availability and accessibility of attachment-related cognitions, which shape how people respond to interpersonal information. An interesting theoretical question arises in the context of the secure base script: What does it mean to have ready access to this script? Does it mean that the person recognizes the secure base script in his or her relationship with certain people (a *relationship-specific* knowledge)? Or, does it mean that the *generalized* (abstract) structure of the secure base script (as it applies to *any* relationship) is available and accessible to the person? As Bowlby (1982) noted, if a knowledge structure “is to be of use in novel situations, it must be extended imaginatively to cover potential realities” (p. 81). Thus, I argue that in order to apply the knowledge of the script in new situations with new relationship partners, the person must have access to the *abstract* (content free) structure of the secure base script—the *common, invariant sequence of events* across different instances (realizations) of the script in different relationships (cf., Gentner & Markman, 1997; Schank, 1999).

Assessing the Accessibility of the Secure Base Script in its Abstract Form. Because of the importance of the secure base script in people’s lives, I hypothesized that many

people (for whom the script is readily available) are able to recognize the abstract script structure even when it is completely stripped of concrete content. Therefore, I developed an assessment technique that would help us identify those individuals who are most able to recognize the abstract structure of the secure base script when it is stripped down to its temporal/causal foundation. The best approach to achieve this goal would be to use stimuli that do not involve any human content. As described in a later chapter, I have followed the method suggested by the classic studies of Heider and Simmel (1944) and Michotte (1946) and created animated film clips that portray simple geometric figures, such as circles and triangles. The geometric figures enact the sequence of events that suggest the secure base script, and respondents are asked to describe what they think is happening in the animations.

Internal Working Models of Attachment

In my view, knowledge about attachment processes is a necessary resource if one is to identify potentially supportive attachment figures. Attachment theory also emphasizes knowledge structures: The theory implies that people need to use *mental representations* or *internal working models* (a social-cognitive concept) if they are to process support-relevant information effectively and if they are to benefit from their past experiences when developing new attachment relationships. Thus, the prototype of indicators of supportiveness may be viewed as one small—but important—component of internal working models of attachment. This way of thinking about models of attachment is more precise than the broader concept, and it leads to a new conceptualization that addresses limitations of contemporary conceptualizations of adult attachment.

Previous research operationalized working models of attachment in two different ways. One line of research examined how people represent their

relationships with *specific* attachment figures (e.g., a person's mother, Main, Kaplan, & Cassidy, 1985). Another way of operationalizing working models has been by examining whether a person has a positive or negative view of attachment relationships and partners in *general* (using participants' self-reports, Shaver, Collins, & Clark, 1996).

However, as Bretherton and Munholland (1999) have commented on the concept of internal working models of attachment, “a number of researchers ... have criticized the concept as being too vague, too general, and not able to generate directly testable hypotheses” (p. 95). Similarly, Hinde (1988) argued that researchers should specify components and mechanisms of internal working models of attachment much more precisely before this concept can be useful (p. 379).

What exactly are “internal working models of attachment”? The origin of this term is based on Bowlby's (1982) observation that as children grow older, their attachment system becomes progressively more efficient: They develop skills and strategies to satisfy their goal of obtaining secure base support from others. According to Bowlby, one way of improving the efficiency of the system is to develop mental representations (internal working models) of common elements in attachment interactions. Bowlby borrowed the term *internal working models* from Craik (1943), who wrote:

If the organism carries a 'small-scale' model of external reality and of its own possible actions within its head, it is able to try out various alternatives, conclude which is the best of them, react to future situations before they arise, utilize the knowledge of past events in dealing with the present and future, and in every way to react in a much fuller, safer and more competent manner to the emergencies which face it. (p. 61).

Thus, an operationalization of working models should (a) allow a precise and detailed specification of the knowledge structures involved, (b) lead to an understanding of how these models help a person process relevant information more effectively, and (c) help a researcher to predict a person's behaviors, cognitions, and emotions in new situations (and with new partners). In later chapters, I apply methods of cognitive psychology to examine the specific content and structure of two relevant knowledge structures, which enable a person to effectively process attachment-relevant information. These knowledge structures concern interactions between self and "available other" (Baldwin, 1992; Baldwin, Fehr, Keedian, Seidel, & Thomson, 1993; Holmes, 2002), but they are not relationship-specific: They do not describe a person's relationship with the person's parent or the person's current romantic partner.

To summarize, I shall examine two broad types of knowledge structures. One, used in creating the KNOWI, concerns indicators of supportiveness. The other concerns the secure base script that unfolds when a person seeks support from a trusted other.

The Value of Knowledge Structures Concerning Support Processes

From an evolutionary perspective it makes sense that humans should have access to sophisticated knowledge structures concerning support. As Haselton and Funder (2006) write: "Human offspring have a remarkably extended period of juvenile dependency, which both requires and provides the skills for surviving in a complex social world" (p. 15). Evolutionary psychologists have therefore suggested that "... the human mind contains an evolved neurocognitive system that is functionally specialized for reasoning about social exchange" (especially about issues concerning trusting others; Cosmides, Tooby, Fiddick, & Bryant, 2005, p. 505).

Thus, I hypothesize that many people have ready access to the secure base script in its abstract form and can recognize it even when it is presented in a form devoid of human content. I shall show that this knowledge has the internal structure of a script: If such a sophisticated script exists and if people do indeed have access to this complex knowledge structure, then the script should help them to organize their perceptions of relevant events and affect how people perceive, interpret, and remember relevant stimuli (Abelson, 1981).

I shall hypothesize—and demonstrate—that indicator-knowledge and script-knowledge are correlated, presumable because they are derived from the same past experiences. In other words, people with better indicator-knowledge also have readier access to the secure base script (script-knowledge).

Individual differences in these relevant knowledge structures should have important cognitive and emotional consequences. Knowing that a partner can be *trusted* to be supportive instills a feeling of security for the future. Several authors have argued that this “interpersonal trust” (Holmes, 2002) or “felt security” (Sroufe & Waters, 1977) plays a crucial role in children’s as well as adults’ psychological well-being. A person who lacks knowledge of the indicators of a supportive partner may make inaccurate judgments about a *potential* partner. Then, after the relationship has been formed, and the person has gained more information about the partner’s behavior in relevant situations, the availability and accessibility of the secure base script should become relevant: A person without an available secure base script may be handicapped in correctly *interpreting* the partner’s attempts to be supportive. In extreme cases, the person may even interpret a supportive partner’s behavior as patronizing or controlling. Thus, these two components of internal working models—

the indicators and the secure base script—are distinct and may play different roles in the development of trust in a partner.

The two knowledge structures may also affect people's effectiveness in receiving support. Bowlby (1979) emphasized the importance of the "...ability or inability of an individual, first, to recognize when a person is both trustworthy and willing to provide a base, and, second, when recognized, to collaborate with that person in such a way that a mutually rewarding relationship is initiated and maintained." (p. 104). Indicator-knowledge (knowledge of valid indicators of a partner's supportiveness) should help a person recognize a potentially supportive partner. Script-knowledge (having access to the secure base script) should then help a person develop a rewarding relationship that provides effective support exchanges.

Plan of This Dissertation

Developing these themes—and subjecting them to empirical tests—is the purpose of the following chapters. Chapter 2 examines the content and structure of the knowledge of indicators that people use to determine whether a potential partner is apt to be there when needed. It also shows how this knowledge structure affects the processing of incoming information. Chapter 3 uses this prototype of indicators to create a measure of individual differences of knowledge (the KNOWI Task). Then Chapter 4 describes a laboratory study that allowed me to demonstrate that people do use this knowledge structure in everyday interactions and that people with better knowledge are better able to notice relevant cues about a person's being there and apply them to make informed decisions about relationships. Chapter 5 then presents further evidence for the convergent and discriminant validity of the KNOWI Task.

In Chapters 6, 7, and 8, I shift the focus to motivation and show that prototypicality ratings may be used to assess the strength of a respondent's motive.

That is, an elevated *motive* leads to elevated *ratings* across all indicators on the KNOWI Task, on average—the elevated motives (*ELMO*) effect. Chapter 9 tests the hypothesis that social performance, like academic performance, is a joint function of knowledge and motivation. It examines the hypothesized statistical interaction between the two indices in predicting performance on an attachment-relevant laboratory task (recognizing supportiveness in a partner). That is, superior knowledge should lead to superior performance only when motivation is high. Chapter 10 presents results of an experience sampling study which extends the findings to naturalistic situations in everyday life. This study shows that motivated and knowledgeable people more often seek support from partners at times of distress.

Chapters 11 and 12 focus on a related knowledge structure concerning an important script that is relevant to attachment relationships—namely, the secure base script. With these studies, I demonstrate that recognizing the secure base script enables a person to process information concerning secure base support. I also show that the two knowledge structures involved in models of attachment—indicator-knowledge and script-knowledge—are themselves correlated. Interestingly, as shown later, people with an avoidant attachment style show a deficit in both knowledge structures. Finally, in Chapter 13, I present a discussion of the entire body of work.

Chapter 2

Indicator-Knowledge:

The Prototype of Indicators of Supportiveness (a Knowledge Structure)

The studies reported in this chapter examined the collection of indicators that people use to determine whether a potential partner is apt to be there when needed (i.e., available and responsive). First (in Study 1a) I shall show that the indicators have the structure and organization of a prototype, such that some indicators are more central to an expectation of supportiveness, whereas other indicators are more peripheral. Then (in Study 1b) I shall show that this knowledge structure affects how people process attachment-relevant information.

Study 1a: Generating the Prototype

The Prototype as a Way of Operationalizing a Knowledge Structure

The prototype method is based upon procedures that Rosch (1975) pioneered to study the way people conceptualize natural categories. Using this procedure, Fehr and others have described the connotative meaning of concepts such as *love*, *commitment*, and *intimacy*. In a typical procedure, a representative sample of participants (nominators) freely list features (indicators, attributes) associated with the concept. The features are then tabulated, and those that had been mentioned by two or more individuals are presented to another sample (raters), who rate each feature's importance to the concept, i.e., its prototypicality or centrality. For each feature, the participants' ratings are then averaged, and features are ordered according to their mean prototypicality rating. This ordered set of features is said to constitute the *prototype* describing the connotative meaning of the concept. Fehr (2004) showed that even complex interaction patterns leading to specific expectations may be structured as prototypes, such that some interaction patterns are more prototypic

than others. Therefore, I first adapted this procedure to derive the prototype of indicators that a potential partner will be there when needed.

The Prototype Affects Information Processing

When activated, a prototype functions as an organizing principle for processing new information (Rosch, 1978). One way researchers have demonstrated such information processing effects has been by using a false recognition paradigm: Participants are shown a partial list of the elements of a prototype (acquisition list), which activates the prototype (concept) itself. Then, participants are given a recognition test, which includes elements of the prototype that have been presented in the acquisition list ("old" elements) mixed with "new" elements of the prototype (that have not been presented in the acquisition phase). False recognition rates for new central (high prototypicality) elements are generally found to be higher than for new peripheral (low prototypicality) elements (Cantor & Mischel, 1977; Fehr, 1988; Hassebrauck, 1997). That is, participants are more likely to erroneously think that they have previously seen new central elements compared to new peripheral elements.

This false recognition effect occurs presumably because the acquisition list (a subset of the prototype's elements) activates the prototype. According to Rosch (1978), one function of an activated prototype is cognitive economy: "It is to the organism's advantage not to differentiate one stimulus from others when that differentiation is irrelevant to the purposes at hand" (p. 29). Thus, once the prototype is activated, participants perceive the new prototypic elements in the recognition list to be *equivalent* to the old prototypic elements. This results in high false recognition rates for the new prototypic elements. New elements that are lower in prototypicality, however, are not perceived to be as *similar* to the presented elements, and therefore

do not show as high a rate of false recognition.

An important assumption of this account is that the presented elements of the prototype of a concept *activate the super-ordinate concept* (along with elements of the prototype). When shown a list of indicators of “being there at times of stress”, for example, the super-ordinate concept of “a partner who is apt to be there when needed” is activated. As Mervis and Rosch (1981) noted, “Virtually all models of categorization involve abstraction ... and the creation of new higher order information which was not given in any particular exemplar” (p. 103). However, the hypothesis—that the presented elements also activate the super-ordinate concept—has not been tested in previous false recognition experiments. In the present study, I tested not only the hypothesis that the activation of the prototype leads to high false recognition rates of the new (non-presented) prototypic elements, but also the hypothesis that the presentation of the elements of the prototype activate the super-ordinate concept (i.e., being there for a partner in times of need).

Method

Participants

The participants in Study 1a consisted of three samples. The first sample (nominators, N = 199) generated the indicators; the second (raters, N = 92) rated the prototypicality of those indicators. The third sample (N = 77) completed a false-recognition laboratory task to demonstrate that the prototype, when activated, affects information processing. Participants in all three samples were students at Stanford University, who participated as part of their course requirement. Approximately 60% in each sample were female and 40% were male; on average, they were 19 years old. Approximately 40% in each sample were Caucasian, 30% Asian American, 10% Hispanic, and 10% African American.

Procedure

Identifying elements of the prototype. The first sample of participants (nominators) received the following instructions:

If you were developing a relationship with a friend or a romantic partner, you would probably ask yourself: Can I count on this person to be there for me emotionally at difficult times when 'the chips are down'? People sometimes use indicators or signs to help them answer questions like these about potential or current friends or romantic partners.

Participants were asked to write examples of such everyday indicators that they could use to make this kind of judgment. Altogether, the nominators generated almost 600 responses, including many repetitions of the same indicator. Adapting the procedure described by Fehr (1988), 165 distinct indicators were identified. Of these, 110 had been mentioned by a single person, and the remaining 55 had been cited by two or more people.

Rating prototypicality. These 55 indicators were then presented to the second sample (raters) who were asked to rate each indicator's prototypicality. The instructions asked participants to imagine developing a relationship with someone *new* and to "rate each indicator to tell how useful you think it would be for determining how much you can count on that person to be there for you". Their ratings ranged along a scale from 1 (*not informative at all*) to 8 (*most informative*).

Rosch's (1975) first criterion for a prototype requires a demonstration that the mean prototypicality ratings are highly replicable. To test this, the data matrix was transposed so that the indicators became cases and the raters became variables. Using the transposed data, Cronbach's alpha was computed. This alpha reflects the stability of the mean prototypicality ratings. Rosch's other criterion for prototypicality

requires a demonstration that the features are organized in a way that affects information processing. To meet this criterion, the indicators were subjected to a false recognition task, as described next.

False recognition task. A 20-item acquisition list was constructed from indicators that are either high or low in prototypicality. Participants ($N = 42$ in this phase of the false recognition study) were tested individually. The items were presented one by one on a computer screen. Each presentation lasted 5 seconds, with a blank 1.5-s interval between items. Each item was a statement describing the relationship between two fictitious people, Chris and Pat, making use of one of the indicators—e.g., “Chris cares about what is important to Pat.” The 20 statements included 10 items derived from the most central (high-prototypicality) indicators and 10 derived from the most peripheral (low-prototypicality) indicators.

Each participant was shown the acquisition list, and after an interpolated activity, was tested for recognition on a test list. The test list contained the 20 items that had appeared on the acquisition list (“old” items) mixed with 20 items that had not appeared (“new” items). Half of the new items were central indicators, the other half peripheral indicators. To control for idiosyncratic characteristics of individual items (e.g., some might sound more familiar, some might be easier to remember), I wanted to counterbalance the role each item played—“old” for half the participants but “new” for the remaining participants. Therefore, two versions of the acquisition list were created; each version was administered to half the participants. Version 1 contained one set of 20 items, which constituted the “old” items during recognition. Another comparable set of 20 items appeared only on the test list, so they constituted the “new” items. The “old” items of Version 1 became the “new” items of Version 2, and vice versa. Thus, every item appeared as an “old” item for half the participants and

as a “new” item for the remaining participants. In this way, idiosyncrasies of individual items were counterbalanced across the two groups. In addition, there were three orders of presentation for each acquisition list, making a total of six different acquisition lists. The final test list included all 40 items and was identical for all participants.

Between the acquisition list and the recognition test, participants performed an interpolated activity in order to interfere with their short-term memory—the Letter-Number Sequencing subtest of the Wechsler Adult Intelligence Scale (WAIS-III; Wechsler, 1997). Then, following Fehr’s (1988) procedure, participants were asked to recall as many of the presented items about Chris and Pat as they could. Finally, they were tested for recognition. The participants were shown the recognition test items and responded “yes” or “no” to indicate whether they thought the item had been presented during acquisition. In addition, they rated their confidence that each item had been presented in the acquisition list using a 7-point scale, ranging from 1 (*definitely not presented*) to 7 (*definitely presented*).

A pilot study with 48 participants suggested that the super-ordinate prototype label, namely, the statement “Chris is always there for Pat when Pat is upset”, elicits very high false recognition rates—even higher than the average false recognition rate for the central indicators. This statement is considered super-ordinate because it uses the wording (“is there for ...”) of the original instructions given to the nominators who generated the indicators (but never seen by the participants of this sample). It is possible that the statement “Chris is always there for Pat when Pat is upset” elicits a high false recognition rate because it is a more abstract statement than the indicators. To rule out this possibility, the pilot study also included a comparably abstract statement that was interpersonal but not specific to this prototype, namely, the item

“Chris is very close and intimate with Pat.” In the present study the hypothesis that the general prototype label is strongly activated by the acquisition list was tested by including these two statements at the end of the recognition test.

The hypothesis was that the super-ordinate prototype label would have a high false recognition rate *because* the acquisition list activates this super-ordinate concept. It is also possible, however, that the super-ordinate statement “Chris is always there for Pat when Pat is upset” elicits a high false recognition rate for other reasons, such as: (a) inherent characteristics of this particular statement increase its false recognition rate (e.g., it is a very familiar sounding statement), and (b) this statement would be falsely recognized after *any* kind of interpersonal concept is activated (and therefore is not specific to the activation of the prototype “being there”). To rule out these alternative explanations, I also examined the false recognition rate for this statement after the elements of a different prototype had been presented. For this purpose, I chose the prototype of “indicators of a good intimate relationship” (Hassebrauck, 1997). This prototype, although distinct from the prototype of indicators of a partner who is apt to be there when needed, has some overlap with it. (In fact, it may be argued that the broader concept “good intimate relationship” includes the narrower concept of “being there for one’s partner”). Therefore, the inclusion of the prototype of a good intimate relationship provides a very strong test of the hypothesis: If the false recognition rate for the statement “Chris is always there for Pat when Pat is upset” is not as high after the similar prototype (a good intimate relationship) is activated, the hypothesis that the high false recognition rate after the presentation of the elements of the prototype of “being there” is due to the activation of the super-ordinate prototype concept receives strong support. Therefore, a separate sample of 35 participants took part in a false recognition task involving the

indicators of a good intimate relationship. The design of this task was identical to the design of the false recognition task involving the indicators of supportiveness.

Results and Discussion

Indicator Generation and Prototypicality Ratings

As expected from a prototype structure, some indicators were produced more often than others by the nominators. The most commonly mentioned indicator (“listens to me”) was cited by 35 nominators. For each indicator, the ratings of the participants in the second sample (raters) were averaged. These prototypicality ratings ranged from 3.68 to 6.94 (across all items, $M = 5.58$, $SD = .82$). The most prototypic indicator was “makes time for me even when he/she is busy.” Table 1 shows the 15 most prototypic indicators. As in previous research (see Fehr, 2004a), the two properties of the features—the frequency with which they were generated and their prototypicality rating—showed only a modest correlation; $r = .29$. The items in Table 1 generally concern the person’s availability, sensitivity, respect for the target’s autonomy, and acceptance of the target’s individuality. It is interesting that these indicators describe the very same caregiver qualities that Ainsworth (Ainsworth, Blehar, Waters, & Wall, 1978) and later attachment researchers (e.g., Grossman, Grossman, Spangler, Suess, & Unzner, 1985; van Ijzendoorn, 1995) have described as the basis for an infant’s felt security that a caregiver will be there when needed.

To characterize the stability of these prototypicality ratings across all 92 raters, Cronbach’s alpha was computed using the transposed data matrix (where the indicators were treated as cases and the participants as variables). This alpha was .97, suggesting that the prototypicality ratings were extremely stable.

Table 1

Indicators of Supportiveness: The 15 most prototypic indicators

ITEM	Prototypicality	
	Rating ^a	Frequency ^b
1. Makes time for me even when he/she is busy	6.94	27
2. Has kept his/her word in prior situations	6.71	6
3. Enjoys just being with me, even if I don't do anything special	6.63	5
4. Is honest and truthful with me	6.59	8
5. Cares about what's important to me	6.57	13
6. Remembers things I've told him/her before	6.56	9
7. Stops by or calls when I'm sick	6.56	6
8. Sticks up for me if someone gives me a hard time	6.55	4
9. Makes an effort to talk to me or see me often	6.54	11
10. Remembers to call if he/she said he/she would	6.54	14
11. Listens to what I say and responds with interest and attention	6.49	31
12. Tells me things that he/she doesn't tell to many people	6.36	4
13. Genuinely cares about my opinion in a conversation	6.35	5
14. Offers to help me with something without my asking	6.26	18
15. Asks me if I'm ok when he/she gets the feeling I'm not	6.20	9

^a N = 92

^b N = 199

Internal Structure of the Prototype: Recognition Task

I hypothesized that the false recognition rate for the new central statements would be higher than those of the new peripheral statements. A repeated measures analysis of variance revealed that the difference between the false recognition rates of central and peripheral new statements were comparable for both versions of the acquisition list and for the three orders of each version a participant received ($ps > .65$). Therefore, these variables will not be discussed further.

False recognition rates for different types of statements are presented in Figure 1. A paired t test showed that, as hypothesized, participants were more likely to falsely recognize central new statements as “old” ($M = .24$, $SD = .18$) compared to peripheral new statements ($M = .11$, $SD = .13$); $t(41) = 6.21$, $p \leq .001$. Participants’ confidence ratings yielded very similar results: Participants were more confident that central new statements had been presented in the acquisition list ($M = 1.96$, $SD = 1.12$) compared to peripheral new statements ($M = 1.21$, $SD = 1.04$); $t(41) = 7.42$, $p \leq .001$. To further examine the relationship between centrality (prototypicality) and false recognition, I computed the correlation between the items’ centrality and confidence ratings; $r = .42$, $p \leq .01$. Centrality was also correlated with false recognition rates: $r = .34$, $p \leq .05$. These results suggest that the acquisition list did, as hypothesized, activate the prototype, which shaped how participants processed incoming information.

The false recognition of the super-ordinate statement “Chris is always there for Pat when Pat is upset” was also examined. As hypothesized, the proportion of participants who falsely recognized this statement was very high: 50% of the participants thought that this statement had been presented in the acquisition list, even though it had not. This proportion was significantly greater than the mean false

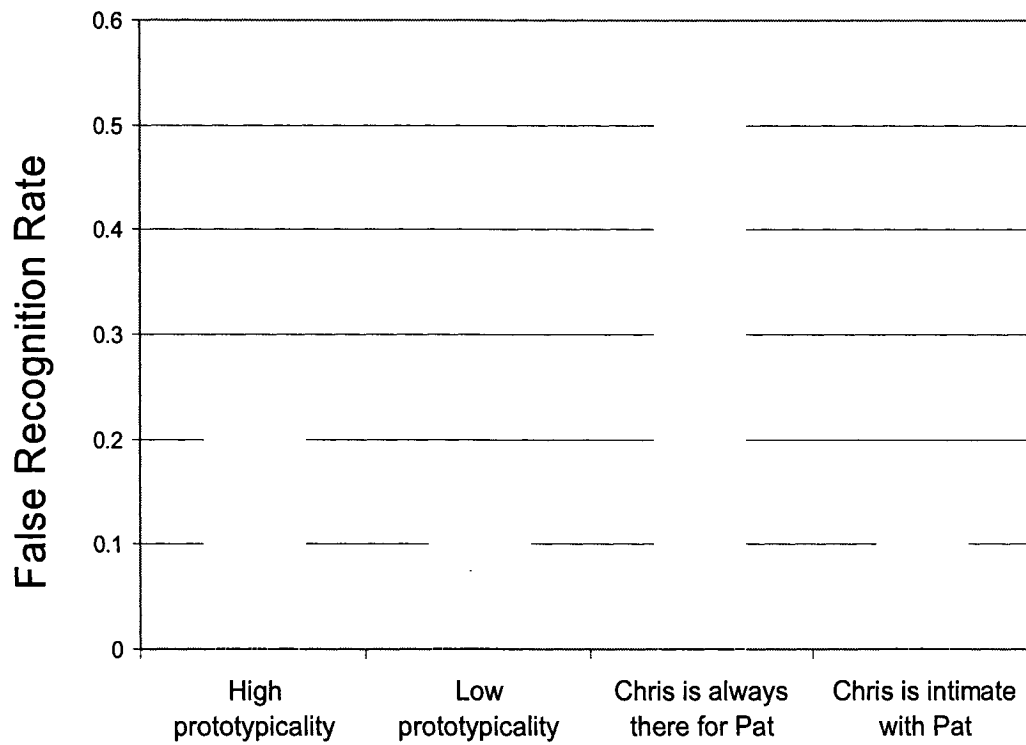


Figure 1. False recognition rates for different types of statements

recognition of the high prototypicality statements; $t(41) = 3.62, p < .01$.

It is possible that the super-ordinate statement was falsely recognized so often because it is more abstract than the other statements or because it appeared at the end of the recognition list. However, a similarly abstract statement “Chris is very close and intimate with Pat” (which also appeared at the end of the recognition list) had a significantly lower false recognition rate (only 19% of the participants) than the super-ordinate statement (falsely recognized by 50% of the participants); by a McNemar test, $p < .01$. Similar results were obtained when participants' confidence ratings were analyzed. Participants were more confident that the statement “Chris is always there for Pat when Pat is upset” had been in the acquisition list ($M = 3.50, SD = 1.74$) compared to the statement “Chris is very close and intimate with Pat” ($M = 2.62, SD = 1.82$); $t(41) = 2.62, p < .05$. Participants were also more confident that the statement “Chris is always there for Pat when Pat is upset” had been in the acquisition list ($M = 3.50, SD = 1.74$) compared to the statements high in prototypicality ($M = 1.96, SD = 1.12$); $t(41) = 6.70, p < .001$. These results suggest that elements of the prototype strongly activate the super-ordinate label, which functions “as an organizing prototype for processing further material” (Cantor & Mischel, 1977, p. 40).

In order to further demonstrate that the high false recognition rate for the super-ordinate statement “Chris is always there for Pat when Pat is upset” is not due to some characteristic of this statement (e.g., it is a very “familiar-sounding” statement), I also examined the false recognition rate for this statement after the elements of the prototype of a good intimate relationship had been presented. (As expected, the mean false recognition rate for the central features of this prototype was significantly higher than the mean false recognition rate for peripheral features.)

If the super-ordinate statement produces high false recognition rates because of some other reason not related to the activation of the prototype of “being there”, then this super-ordinate statement should also be falsely recognized more often after other prototypes have been activated. However, the statement “Chris is always there for Pat when Pat is upset” had a significantly lower false recognition rate (17 %) after the activation of the prototype of a good intimate relationship, compared to 50% false recognition rate after the activation of the prototype of indicators of supportiveness; $\chi^2 = 9.05$, $p \leq .01$.

Analyses using the confidence ratings yielded very similar results: Participants who had been shown the indicators of supportiveness in the acquisition phase were more confident that the statement “Chris is always there for Pat when Pat is upset” had been presented ($M = 3.50$, $SD = 1.74$) compared to participants who had been shown the elements of a good intimate relationship in the acquisition phase ($M = 2.42$, $SD = 1.64$); $t = 2.72$, $p \leq .01$.

In brief, results of the present study show that the pool of indicators meets the two classical criteria of a prototype. First, the elements can be rated reliably for prototypicality. Second, they are organized in a way that affects cognitive processing of stimuli concerning the supportiveness of a potential partner.

Study 1b: Prototype Matching as a Predictor of Partner's Supportiveness

Results of Study 1a suggest that people use the prototype of indicators of supportiveness in order to organize and understand incoming attachment information. Theoretically, one major function of this prototype should be to help a person to decide who is apt to be there when needed and who is not. As Hassebrauck and Aron (2001) argue, knowledge structures are used to understand new stimuli in terms of existing categories: “Evaluations such as this are often made by comparing the

object to be judged with stored knowledge about the respective category.” (p. 1111). This comparison process is sometimes called *prototype matching*.

Using the prototype of a good intimate relationship, Hassebrauck and Aron (2001) tested the prototype matching hypothesis. Participants in their study judged how well each element of the prototype characterized their own romantic relationship. Judgments made about the most prototypic elements were the best predictors of people’s *global* evaluation of their relationship. That is, the better a relationship matched the prototypic features of a good intimate relationship, the higher quality it was perceived to be. Using a similar strategy, Fletcher, Simpson, & Thomas (2000) and Simpson, Fletcher, & Campell (2001) demonstrated that the match between a person’s *actual* image of a partner (or relationship) and the corresponding *ideal* image of a good partner predicts the quality of a relationship—as well as the probability that the relationship still exists 3 months later. The present study (Study 1b) applies the prototype matching construct to the prototype of supportiveness and demonstrates that the most prototypic elements of supportiveness are the best predictors of global judgments of a romantic partner’s supportiveness.

Method

The participants were 67 students (20 males and 46 females; one participant did not specify gender) from the Introductory Psychology classes at Stanford University. They participated in the study as part of a course requirement.

The participants completed three measures. The predictor measure, labeled “Characteristics of Your Relationship,” contained 32 items derived from the elements of the prototype of indicators of supportiveness that was generated in Study 1a. The items varied in their prototypicality—high (H), medium (M), or low (L): 11 H-items, 10 M-items, and 11 L-items. The participants were asked to consider their most recent

romantic relationship and to rate each item to tell how well that item described their relationship.

The other two (criterion) questionnaires required each participant to rate how supportive the relationship partner seemed to be. One was the Secure Base Support Questionnaire (Cassidy & Woodhouse, 2003). This measure contains 16 items that describe how well the partner provides a secure base for the participant; in the current study, Cronbach's $\alpha = .95$. The other was the Trust Questionnaire (Rempel, Holmes, & Zanna, 1985). That measure contains 17 items, divided into three subscales. The authors consider the Faith subscale (assessing the amount of respondent's faith that the partner will be there when needed) to be theoretically the most important. Since it is also the most relevant to my formulation of supportiveness, I report results only for that subscale. In the present data Cronbach's $\alpha = .91$.

Results and Discussion

To assess how well a participant's partner seemed to match the prototype, I averaged the participant's responses to the 32 prototype-derived items of the predictor measure (Characteristics of Your Relationship). These values were then correlated with the Secure Base Support Questionnaire; the Pearson r was .85. Theoretically, highly prototypic items should be better predictors of global judgments, so the prototype-derived items of the predictor measure were separated into the H, M, and L sets. The means for each set were individually correlated with the Secure Base Support Questionnaire. The Pearson r s were, respectively, .82, .81, and .63 for the H, M, and L items. The difference between the r s for H versus L items was significant; $t(64) = 3.05$, $p < .005$ (see the formula proposed by Cohen & Cohen, 1983, concerning a test for non-independent r s). However, the difference for H

versus M items was not significant.

In addition, hierarchical regression analyses were performed to predict Secure Base Support. When H items were used as the first predictor, the R^2 was .68; adding the M items, explained an additional 5% of the variance ($p < .001$); adding L items did not explain a significant amount of variance (only 0.6% of the variance; $p = .25$). When the variables were entered in the reverse order, however, the pattern was different: The L items, when entered first, explained 40% of the variance, the M items, an additional 27%, and the H items, an additional 7% of the variance (all ps for R^2 change $< .001$). Thus, the L items had no predictive power beyond that of the H and M items.

In the same way, the Faith subscale of the Trust Questionnaire was used as a global judgment of the partner's supportiveness, and I assessed its correlation with the same predictor. The overall Pearson r was .80. For the H, M, and L items, respectively, the Pearson rs were .77, .76, and .62. Again, the difference between the Pearson rs with H and L items was significant; $t(64) = 2.19$ $p < .05$.

As before, hierarchical regression analyses were performed. When H items were used as the first predictor, the R^2 was .60; adding the M items explained an additional 5% of the variance ($p < .01$); adding L items explained only an additional (nonsignificant) 1% of the variance. When the variables were entered in the reverse order, the L items explained 38% of the variance, the M items, an additional 22%, and the H items, an additional 6% of the variance (all ps for R^2 change $< .002$). Again, the predictive power resided entirely in the H and M items.

To summarize, features of the prototype can be used as predictors of a person's global judgment of his or her partner's supportiveness. Furthermore—and perhaps this is the most important point—indicators that are more prototypic are

better predictors of global judgments: Indicators low in prototypicality are predictive only to the extent that they share variance with the more prototypic indicators. This result resembles the one reported by Hassebrauck and Aron (2001).

Chapter 3

Individual Differences in the Knowledge Structure:

Constructing the KNOWI Scale

Introduction

Study 1 exposed the knowledge structure of indicators that people use to predict whether a potential partner “will be there for me” at times of future stress. In Study 2 (described next) I created a measure to differentiate among people in their knowledge of indicators of a partner’s likely supportiveness when support is needed. As described below, the resulting measure is short, easy to administer, and easy to score.

The Value of Prototypicality Ratings

The mean prototypicality rating of an indicator is thought to reflect the aggregated wisdom of the group. According to Einhorn, Hogarth, & Klemper (1977), Linstone and Turoff (1975), and Rosch (1978), a large sample’s mean often provides the best available estimate of “reality”—i.e., it is better than the individual judgments of most group members. Similarly, Funder and Sneed (1993) present data supporting the validity of the wisdom of the group when predicting other people’s personality traits. Therefore, the indicators rated highest by the group (i.e., high in mean prototypicality) are thought to be very good indicators that a partner will be there when needed, whereas those rated lowest by the group are thought to be poor indicators.

Knowledgeable people probably use a wide variety of indicators, and Study 1 exposed those indicators empirically. The methods of Study 1 did not impose any theoretical constraints upon the indicators. However, I anticipated the kinds of characteristics that may emerge. Developmental and social psychologists have already provided insight into factors that lead one partner to expect another to be

there. For example, attachment theorists, writing about the caretaker-infant relationship, have demonstrated the importance of the caretaker's availability, sensitivity, acceptance, and respect for autonomy. Other theorists have proposed similar concepts to characterize adult relationships theoretically (Feeney & Collins; 2001; Holmes & Rempel, 1989; Reis & Patrick, 1996; Schachner, Shaver, & Mikulincer, 2005). By adopting a purely empirical approach, I could compare the indicators discovered empirically with this earlier literature.

Once I obtained a pool of indicators, I used them to create the test that assesses individual differences in knowledge: Participants were required to rate each indicator to tell to what extent it would increase their confidence that a potential partner will be there for them. From these ratings I evaluated each participant's ability to discriminate between prototypic ("good") indicators and non-prototypic ("poor") indicators. The greater the difference between the ratings of the two, the better that person's ability to discriminate—and the greater I judged that person's knowledge to be. In this way, the participant's task was considered to be analogous to a signal detection task in which the participant had to discriminate signal ("good" indicators) from noise ("poor" indicators). In brief, I assessed participants' knowledge by assessing their ability to make discriminations between good and poor indicators.

I also considered a simpler method of assessment, namely, examining the participant's ratings of only the highly prototypic items. After all, the core of a concept is conveyed by its most prototypic indicators, and I wanted to assess how well each participant knew the importance of these indicators. However, I rejected this approach for two reasons: First, participants differ considerably in the way they use the response scale. If a participant assigns generally high ratings to all indicators, both good and poor, that participant would obtain a high score on the "good"

indicators without having the ability to discriminate good from poor indicators.

Second, in my view, a “knowledgeable” person, when judging potential partners, should be just as able to ignore the presence of poor indicators as to take note of good indicators. Mervis and Rosch (1981) made a similar point, namely, that successful categorization involves determining “which elements of a situation are *essential* and which irrelevant” (p. 103). For these reasons, the scoring method described below required participants to know the difference between good and poor indicators.

Method

Developing the Test

Not all indicators generated in Study 1 would be equally good as items for a test of participants’ ability to discriminate good from poor indicators. For example, some indicators, because of their social desirability, would receive high ratings of prototypicality by *all* participants and therefore would not discriminate among participants. In addition, some would also be indicators of other semantically related constructs, so they are not specific to knowledge about being there for a partner (cf., Mervis & Rosch, 1981; Rosch, 1978). For example, knowledge structures concerning *love* and *intimacy* may contain indicators that overlap with those of being there for a partner. Therefore, I needed to identify the most discriminating indicators. To do so, I used the following iterative procedure.

First, I tested two preliminary samples. The participants in each sample were students in Introductory Psychology classes at Stanford University who participated as part of their course requirement. Sample 1 (N = 62) included 27 men and 35 women; 25 were Caucasian, 18 Asian American, 8 Hispanic, 6 African American, and 5 other. They ranged in age from 16 to 21 years; M = 19.0, SD = 1.17. Sample 2 (N

= 47) included 20 men and 27 women; 18 were Caucasian, 12 Asian American, 3 Hispanic, 4 African American, and 10 others. They ranged in age from 16 to 22; $M = 19.1$, $SD = 1.23$.

I wanted to start with a large pool of potential items for my test. In addition to items representing the 55 non-idiosyncratic indicators, I also added a set of idiosyncratic indicators. One reason for including idiosyncratic indicators was to provide a set of potentially *poor* indicators that would contrast with the best indicators. Idiosyncratic indicators were selected to be comparable in length, situational specificity, positivity, social desirability, and other similar properties. The final set contained 94 potential items.

To keep the task manageable, I divided this pool of 94 items into two sets of 45 and 49 items. One set was administered to participants in Sample 1, the other to participants in Sample 2. Participants were asked to rate each indicator to tell to what extent it would increase their confidence that a potential partner will be there for them. The verbatim instructions can be found in the Appendix.

The rating scale ranged from 1 (“would not really increase my confidence that a potential partner will be there for me”) to 8 (“would very much increase my confidence that a potential partner will be there for me”). In prototype studies researchers typically ask participants to rate the *prototypicality* (or centrality) of each feature. However, Hassebrauck (1997) argued that the meaning of “prototypicality” may not be clear to participants. In his study, he asked participants to rate the quality of each feature as an *indicator* of the construct. Similarly, Fehr (2004a), in her study of interaction patterns that lead to expectations of intimacy, instructed participants to rate each interaction pattern to indicate “how likely it is to produce a sense of intimacy” (p. 272). In the present study, I adopted a similar approach and asked

participants to rate the quality of each item as an indicator that a potential partner will be there when needed. In this report I use the terms *prototypicality* and *judged quality of an indicator* interchangeably.

Iterative procedure for identifying discriminating items. My goal was to assess each participant's ability to discriminate valid indicators (which knowledgeable people recognize to be superior) from invalid indicators (which knowledgeable people recognize to be inferior). To do so, I needed to know which items (valid, as well as invalid indicators) discriminate best between more knowledgeable and less knowledgeable people. This issue resembles a problem posed by Item Response Theory (Lord, 1980): How does one *simultaneously* estimate *item* characteristics (item parameters) and *person* characteristics (person or ability parameters)? The estimation of each of these parameters requires that one know the other parameter.

To handle this problem, I drew upon Lord's (1980) suggestions and used an iterative procedure: Separately for Sample 1 and Sample 2, I began with initial estimates of the participants' ability, using the large pool of 94 high- and low-prototypicality items. From these estimates of each participant's ability, I could then determine which *items* best discriminated "high ability" from "low ability" participants. As described below, I then used an iterative procedure to revise the set of items that best discriminate between "high ability" and "low ability" participants. Procedural details are described next.

The first two steps (1a and 1b) assessed each *participant's* ability to discriminate valid from invalid indicators:

Step 1a. I identified the 15 items with the highest means across participants (Set H) and the 15 items with the lowest means (Set L).

Step 1b. I computed, for each *participant*, the mean rating for Set H, the

mean rating for Set L, and the difference between the two ($H - L$). This difference-score provided a first estimate of each *participant's* ability to discriminate.

The next two steps used these difference-scores to estimate each *item's* power to discriminate among participants:

Step 2a. I identified the participants with the largest ($H - L$) difference-scores and those with the smallest ($H - L$) difference-scores. The highest third were called “good discriminators” and the lowest third, “poor discriminators”.

Step 2b. I then computed, for each *item*, the mean rating by good discriminators, the mean rating by poor discriminators, and the difference between the two. This difference operationalizes each item's discrimination power. It resembles an *index of discrimination* used in test construction (e.g., Anastasi, 1982).

I called the 15 items that showed the greatest positive difference D_p (for “discriminating-positive”) items, and the 15 items that showed the greatest negative difference D_n (for “discriminating-negative”) items.

D_p items constitute valid indicators: They were rated relatively higher by “good discriminators” than poor discriminators. D_n items, on the other hand, constitute invalid indicators: They were rated relatively lower by “good discriminators”. Thus, the D_p items were (a) successful in discriminating among participants, and, as shown below, (b) they were high in prototypicality.

Knowledgeable people (good discriminators) rated these items higher. The D_n items, on the other hand, were (a) also successful in discriminating among participants, but (b) low in prototypicality. Knowledgeable people rated these items *lower*.

Finally, using these D_p items as the new Set H and the D_n items as the new

Set L, the entire procedure was repeated with another sample of participants until further iterations yielded the very same items for the D_p and D_n sets (that is, until the items in each set became stable). Stability was achieved by the second iteration for the data of both Sample 1 and Sample 2.

Construction of final form of the measure. This procedure enabled me to choose the most discriminating items from the sets of items presented to Sample 1 and Sample 2. I made a single list ordering the items of both sets in terms of their discrimination power. Then, I chose the best 22 D_p and the 23 D_n items that were comparable in their discrimination power. In order to test these 45 items on a larger sample and further reduce their number, the items were then administered to a new sample of 217 participants (Sample 3). This sample included 84 men, 126 women, and 7 who did not report their gender; they were all students in Introductory Psychology classes at Stanford University. The sample included 98 Caucasians, 63 Asian Americans, 24 African Americans, 22 Hispanics, and 10 others. They ranged in age from 17 to 31 years; $M = 19.1$, $SD = 1.51$. Using the iterative procedure described above on this sample's data, I obtained the best 11 D_p items and the best 11 D_n items. Nineteen filler items were added to reduce the distinctiveness of the two sets of discriminating items (valid vs. invalid indicators). The filler items were chosen randomly from the set of non-discriminating items used with Samples 1 and 2, with the restriction that they be comparable to the D_p and the D_n items in terms of length, positivity, social desirability, and other similar properties. Although their mean ratings of prototypicality varied, none was useful in discriminating among participants. The final set of 41 items constituted the "Knowledge of Indicators (KNOWI)" Scale. The items of the scale, the instructions for the participants, and the rating scale can be found in the Appendix.

Cross-validation Sample

In order to demonstrate that the D_p and D_n items formed distinctively different sets (as revealed by principal components and cluster analyses), the KNOWI Scale was administered to three new samples—Sample A ($N = 149$); Sample B ($N = 103$); Sample C ($N = 97$). The combined sample ($N = 349$) included 107 men, 213 women, and 29 who did not report their gender; 178 participants were Caucasians, 73 Asian Americans, 51 African Americans, 40 Hispanics, and 7 others. Their ages ranged from 17 to 43 years.

The mean prototypicality rating for each D_p , D_n , and filler item was computed for the combined sample ($N = 349$); these means are shown in the Appendix. The mean rating across the 41 indicators was 5.41 ($SD = .90$). As shown in the Appendix, prototypicality ratings for all of the D_p items were above this mean, and the prototypicality ratings for all of the D_n items were below this mean. The means across the items for the D_p and D_n sets, respectively, were 6.29 and 4.13; $t(348) = 30.99$, $p < .001$. Thus, as expected, the D_p items were, on average, judged to be indicators of higher quality than the D_n items.

In addition, the corresponding mean prototypicality ratings for each pair of sub-samples were correlated. These Pearson r s ranged from .96 to .98 for each pair of sub-samples, reflecting stability in item means.

Results

Statistical Properties of the KNOWI-Scale

Principal components analysis with varimax rotation. First, a principal components analysis was performed separately on the data of each of the three samples (excluding the filler items). The results for all samples were very similar, so a principal components analysis was performed on the combined sample ($N = 349$).

A scree test revealed two components with eigenvalues of 7.36 and 3.13; all other eigenvalues were less than 1.24. A varimax rotation was performed, yielding two components that corresponded, respectively, to D_p and D_n items. The loadings of the D_p items on one component ranged from .52 to .72 (none of the D_n items had a loading within this range). The loadings of the D_n items on the other component ranged from .48 to .85 (none of the D_p items had loadings within that range). Thus, the principal components analysis clearly differentiated between the D_p and D_n items.

To examine the stability of these loadings, I correlated the corresponding loadings of the 22 items obtained from each sub-sample. For each pair of sub-samples, the loadings on the first factor showed correlations of .94, .95, and .96. The loadings for the second factor showed correlations of .84, .90, and .90. This result shows the stability of the factor structure.

Unrotated principal components solution. I also examined the two original components provided by the *unrotated* solution, and I report that result as well because it highlights an uncontrolled source of variance that will be considered when I describe the scoring procedure in the following section. In the unrotated solution, it was the *second* component that differentiated D_p from D_n items: Every D_p item had a positive loading on this component, and every D_n item had a negative loading. The *first* unrotated component, on the other hand, seems to reflect a bias among respondents in their use of the rating scale (Wiggins, Steiger, & Gaelick, 1981). That is, participants use the rating scale differently—some rate all items relatively high, others rate all items relatively low—so all pairs of items tend to show some degree of positive correlation. As a result, all items, D_p and D_n items alike, showed a positive loading on this first component. In Study 5 I will return to this first factor and show that it reflects the strength of a respondent's motive for supportive partners.

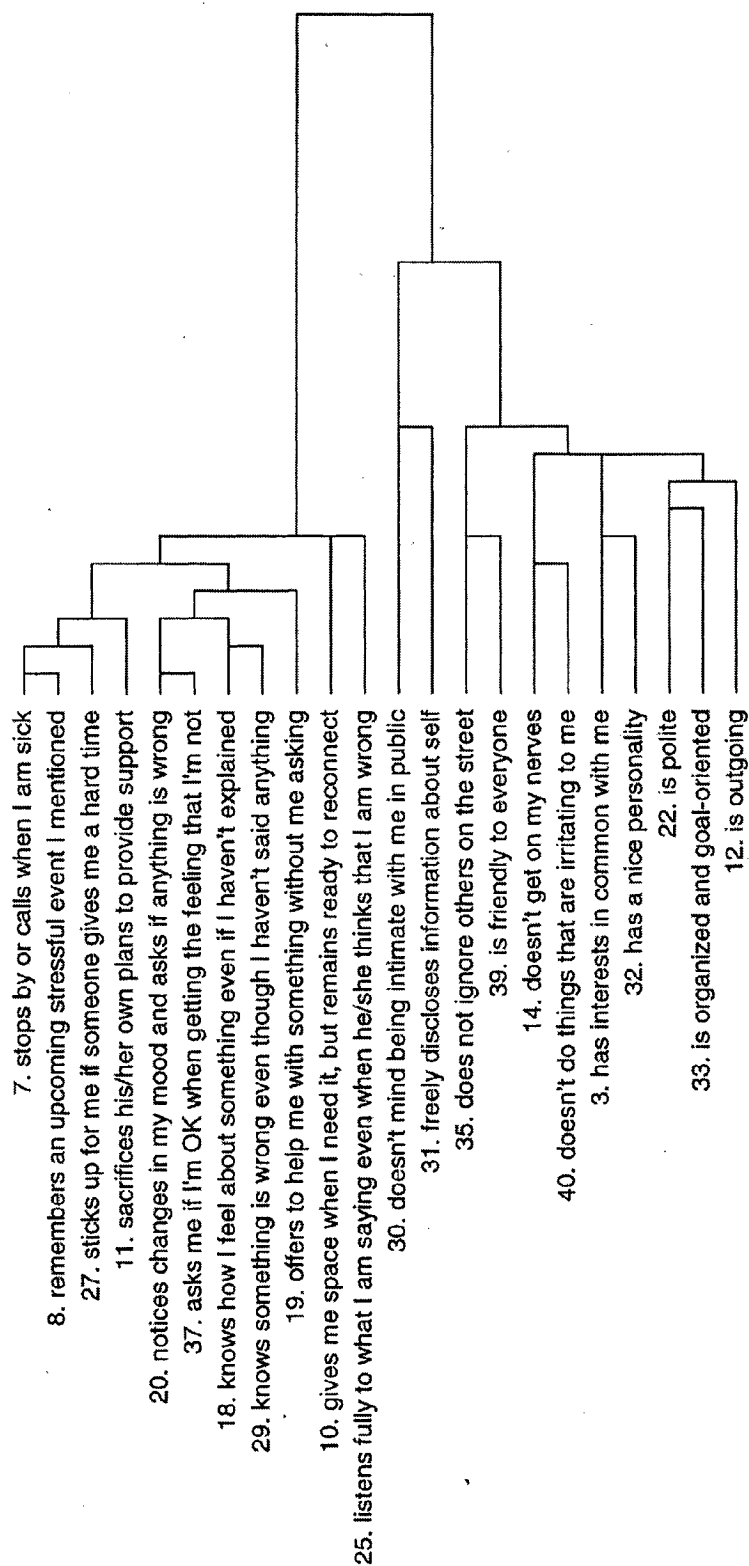


Figure 2. Results of the cluster analysis of the D_p and D_n items of the KNOWI Scale. The top

11 items are all D_p items and the bottom 11 items are all D_n items.

The D_p items were all high in prototypicality, whereas the D_n items were all low in prototypicality. Generally speaking, high-prototypicality indicators seem to be more cohesive than low-prototypicality indicators and, for that reason, seem to lead to more false recognition errors on a memory test (Fehr, 1988; Hassebrauck, 1997). I therefore hypothesized that the D_p items would display greater cohesiveness in a cluster analysis. To test this hypothesis, I performed a hierarchical cluster analysis (Everitt, 1974) using agglomeration schedule and squared Euclidean distance to reveal the organization of D_p and D_n items. The result of this analysis is shown in Figure 2. All D_p items clustered together to form one major cluster, and all D_n items clustered together to form a second major cluster—with no overlap between the two. As shown in Figure 2, the clusters of the D_p items (Cluster D_p) were tighter than those of the D_n items (Cluster D_n). This result reflects the stronger associative links among high-prototypicality items than among low-prototypicality items.

As shown in Figure 2, the D_p items included two rather tight subclusters: One (Cluster d_1) contained 4 items; the other (Cluster d_2) contained 5 items. These two clusters then joined each other, and that larger cluster was then joined by the two final items. The items of Cluster d_1 all concerned the person's availability for providing support when a target person needs it—e.g., "stops by or calls when I am sick". The items of Cluster d_2 all concerned the person's sensitivity to subtle cues in the target person—e.g., "notices changes in my mood and asks if anything is wrong". The remaining two items concerned respecting the target person's autonomy ("gives me space when I need it, but remains ready to reconnect"); and accepting the target person's separateness ("listens fully to what I am saying even when he/she thinks that I am wrong"). It is interesting that these four categories describe the very same caregiver qualities that Ainsworth (Ainsworth, et al., 1978) and later attachment

researchers (e.g., Grossman, Grossman, Spangler, Suess, & Unzner, 1985; van Ijzendoorn, 1995) have described as the basis for an infant's expectation that a caregiver will be there when needed. Likewise, Schachner, Shaver, and Mikulincer (2005) have hypothesized that similar elements should lead to a feeling of security in adult-adult relationships.

Scoring the KNOWI Scale

I wanted to devise a simple scoring method for the KNOWI. A person who discriminates well between D_p and D_n items (i.e., between valid and invalid indicators) is one who rates the D_p items substantially higher than the D_n items. One can use two different methods to assess a person's ability to discriminate. The two methods yielded similar scores (Pearson $r = .86$), and, in the data analyses reported later, both methods led to identical conclusions in all cases.

The first method was a Pearson r (with an r -to- z transformation) between the participant's ratings of the 22 items and the corresponding group-generated prototypicality ratings (mean ratings of prototypicality for the large normative sample). Though this method is conceptually easy to understand, I preferred another method based on signal detection theory that has empirically demonstrated advantages (Paulhus, Harms, Bruce, & Lysy, 2003).

To clarify the second method, let us use D_p to denote a given participant's mean rating across the 11 D_p items, using raw, non-ipsatized ratings. Let us use D_n to denote the corresponding mean of the D_n items. The difference between the two means for a given individual, is denoted $D_p - D_n$. This difference-score, which I will call KNOWI-accuracy, would reflect that person's ability to discriminate, except for one problem: As revealed by the unrotated principal components solution, people differ in their use of the rating scale: Some consistently rate all items high, some

consistently rate all items low. For two people, $D_p - D_n$ might equal 3, but the 3-point difference might not have the same meaning if one person rated all items relatively high and the other person rated all items relatively low.

Following the recommendation of Paulhus et al. (2003), I used $(D_p + D_n)$ to assess the magnitude of the person's overall ratings; that value was then used as a covariate. The method thus consisted of a statistically corrected value $(D_p - D_n)$ for each participant. Expressed simply, partial correlations were used to equate people statistically on $(D_p + D_n)$. Although the development of the scale itself may seem laborious to the reader, the scoring itself is quite simple: It requires nothing more than a sum and a difference between the ratings of valid and invalid indicators. The same method was used in analyzing the data of all studies reported in this report.

This method is actually derived from signal-detection measures of accuracy and bias. Paulhus et al., (2003; see also Paulhus & Harms, 2004) used a procedure similar to mine for assessing intelligence. Participants were asked to rate their familiarity with particular words (including non-words). The investigators assessed each participant's accuracy (hit rate – false alarm rate) and statistically corrected it for "criterion bias" (hit rate + false alarm rate). Then they demonstrated that this statistically corrected measure of accuracy was highly correlated with a direct measure of intelligence. It can be shown that my procedure and that of Paulhus and Harms are mathematically equivalent.

My way of scoring the KNOWI Scale thus provides an index of accuracy (or sensitivity), as used in signal detection theory. The concept of criterion bias, which also appears in signal detection theory, may be relevant as well in scoring the KNOWI. Criterion bias is generally considered to be a motivational variable that determines a participant's readiness to rate *all stimuli* as signal. I believe that

criterion bias on the KNOWI is related to the respondent's *motivation* for having relationships with a partner who is apt to be there when needed. In later chapters I shall therefore focus on the use of the KNOWI Scale to assess the strength of each person's motive. For now, however, I continue to examine the KNOWI's value in assessing each person's accurate knowledge of the indicators.

Test-retest Reliability

Finally, I examined the test-retest reliability of the KNOWI using a subset of the cross-validation sample ($N = 116$) described above. These participants completed a second administration of the test three to seven weeks later. Their scores on the two occasions were correlated. For the D_p items, $r = .69$; for the D_n items, $r = .67$; for the $(D_p - D_n)$ scores, $r = .63$; and for the $(D_p + D_n)$ scores, $r = .69$. Thus, the test-retest reliability of the KNOWI Scale seemed satisfactory.

Discussion

The D_p items were designed to have two important properties: (a) They are all prototypic indicators of a potential partner's being there; and (b) they discriminate between more knowledgeable and less knowledgeable participants. Therefore, an indicator's prototypicality (the first property) is a necessary, but not sufficient criterion for it to qualify as a D_p item (see the Appendix). For example, the item "loves me very much," which received a very high mean prototypicality rating, did not qualify as a D_p item.

The common theme that characterizes the D_p items seems to be that the partner "attends to my needs," "is able to recognize my distress," and "cares about me enough to provide support." Kelley and Thibaut (1978) refer to a supportive person's "active transformation of motivation from egocentric to altercentric". That is, to some extent, a supportive partner seems to make the supported person's needs a

priority over his or her own needs.

Thus, the D_p indicators suggest that the partner has the ability and motivation to provide support. This inference then leads the person to *trust* the partner to be there consistently in future situations. This view is similar to that proposed by Rempel, Holmes, and Zanna (1985), namely, that trust involves a *leap of faith*: From available evidence, the person makes attributions about the partner's motives (and abilities), and this generalization leads to expectations that the partner will be there in unknown future situations.

To summarize, Study 2 was based on the following four assumptions: (a) A prototype provides a knowledge structure—in this case, the knowledge of indicators that a potential partner is apt to be there when needed. (b) This knowledge structure, derived from a large group, exposes that group's collective wisdom. (c) Each person possesses an individual knowledge structure, but the quality of that knowledge differs from person to person. (d) A person whose individual knowledge structure allows greater access to the group's collective wisdom would seem to be in a better position to make informed judgments about potential partners. The KNOWI Scale provides a method for assessing the quality of each person's knowledge. The next step was to demonstrate the validity of the KNOWI Scale in a laboratory setting.

Chapter 4

Knowledge of Indicators and Thinking about a Specific Relationship:

Predictive Validity of the KNOWI

Introduction

Chapter 3 described the development of the KNOWI Scale and its reliability. The following study (Study 3) was designed to demonstrate that scores on KNOWI-accuracy can be used to identify people who do, in fact, make use of such indicators in everyday interactions. I hypothesized that people with better knowledge (high scores on KNOWI-accuracy) would notice relevant cues about a person's "being there" and apply those cues to make informed decisions about relationships. Study 3 tested this hypothesis in a laboratory setting.

Method

Each participant in this study interacted with a confederate. In order to standardize the conditions across participants, the participants and confederates were all women. In each interaction, the female confederate described a personal problem involving her female roommate. The participants were instructed to listen and react naturally to the confederate's problem. The problem description included subtle incidental details that could be taken to indicate that the roommate's boyfriend was not apt to be there for his girlfriend. The study assessed the participants' sensitivity to these incidentally mentioned details.

Participants

The participants were 56 female undergraduate students enrolled in the Introductory Psychology course at Stanford University. Their mean age was 20.8 (SD = 1.52). Twenty-two were Caucasian, 15 Asian American, 6 Hispanic, 6 African American, and 7 others. Every participant had completed the KNOWI Scale as part

of a questionnaire packet administered early in the term.

Confederates

The confederates were two senior undergraduate women. They memorized a prepared script and then practiced their role with approximately 20 pilot participants. Each pilot session was videotaped, and the two confederates and the first author watched the videotapes to refine the script and the confederates' performance.

Procedure

The participant, upon arriving at the laboratory, was introduced to her partner (the confederate). The experimenter then explained that the two of them would have a conversation together in which one, selected at random, would describe a personal problem to the other. The confederate was always "selected" to be the person describing the problem. She was told to think of a problem that had arisen recently in her life. The participant was then selected to be the listener. She was asked to listen and react naturally to her partner as though she were interacting with a close friend.

The problem that the confederate described concerned a recent difficulty with her roommate. The roommate had become distant and upset for reasons that the confederate did not understand. The confederate then proceeded to describe recent negative events in her roommate's life. In the course of describing the roommate's situation, she also mentioned that her roommate was in a new relationship with a boyfriend. The boyfriend was described in generally positive terms (e.g., "he is fun to be with"), but three brief vignettes that the speaker "happened" to mention all reflected violations of D_p items of the KNOWI Scale; that is, they revealed possible cues indicating that the boyfriend is not apt to be there for his girlfriend. In the first vignette (given the title "Job"), the confederate reported an incident in which the boyfriend forgot about an important job interview that his girlfriend had mentioned and

just completed. This vignette depicted the boyfriend's violation of Item 8, "remembers an upcoming stressful event I mentioned and asks me about it afterwards." In a second vignette ("Vegetarian"), the boyfriend's friends were teasing the roommate for being a vegetarian, and she became upset. The boyfriend failed to notice that she got upset and did nothing to intervene. This vignette depicted a violation of Item 20, "notices changes in my mood and asks if anything is wrong" as well as Item 27, "sticks up for me if someone gives me a hard time". In the third vignette ("Dog"), the confederate reported that the roommate's dog had recently died, making her quite upset. That evening, when she wanted her boyfriend to stay with her, he said that he had homework to do and left, thereby violating Item 11, "sacrifices his/her own plans to provide support".

The confederate and experimenter were both blind to the participants' scores on the KNOWI Scale. The confederate adhered to the prepared script as closely as possible. She answered questions as briefly as possible and maintained a uniformly neutral acceptance of the participant's reactions. The partners were allowed to continue their discussion for a maximum of 13 minutes. The complete interaction was videotaped.

Semi-structured Interview

After the interaction was over, the experimenter led the two participants to separate rooms, where they completed a questionnaire about their experience. Then the experimenter interviewed the participant about her interaction with the confederate. The interviewer asked successive questions that led the participant quite naturally to describe the partner's problem, the roommate's relationship, and the boyfriend's characteristics: (1) To begin with, the interviewer asked the participant to describe the problem that the confederate had told. From the participant's point of

view, the interviewer did not know what the confederate had talked about. This first question gave the participant a chance to tell the interviewer about the confederate's problem. Then the interviewer could legitimately ask about the boyfriend because the interviewer had now been informed about the roommate and her boyfriend. The next two questions asked about the confederate—(2) what she seemed to want from the interaction and (3) whether the participant was able to help. These questions served to disguise the main purpose of the interview (namely, to inquire about the boyfriend's being there). (4) Then the interviewer asked what the participant thought of the roommate's relationship with her boyfriend and what kind of a boyfriend he seemed to be. (5) The next question asked what the participant would do if she were in the roommate's shoes. Finally, to test the limits of the participant's understanding, the interviewer asked direct questions about the boyfriend's being there: (6) "Could the roommate go to the boyfriend about her problems?" and (7) "Would he be there for her?" The entire interview was audiotaped.

Coding of interview. Three coders (the first author and two research assistants), all blind to the participants' scores on the KNOWI Scale, listened to each tape recording and independently coded each interview using the following procedure. First, each vignette ("Job," "Vegetarian," "Dog") was rated separately on a 7-point scale. In order to obtain a high score, the participant had to remember details of the vignette *and* cite them as a possible indicator of the boyfriend's not being there. A low rating was assigned whenever a vignette was recalled without making any connection to the boyfriend's being there (e.g., citing the vignette to illustrate the boyfriend's positive qualities). Finally, the coders made one additional rating of the participant's *overall* understanding using (a) the separate scores for the three vignettes as well as (b) other comments that the participant had volunteered. This

final rating was used in the analyses reported below. The lowest rating (1) indicated that a vignette was never cited as evidence of not being there—that is, vignettes were never mentioned, or a vignette was recalled either without any inference or as evidence of a *desirable* quality. The highest rating (7) indicated that the participant remembered all three vignettes, recognized their significance, and drew a clear inference. These ratings thus reflect the participant's sensitivity to cues related to being there. The three raters' ratings were then averaged to yield a measure of each participant's ability to apply the knowledge. The inter-rater reliability was good; intraclass correlation = .93.

After the semi-structured interview, the participant completed the KNOWI Scale a second time. By administering the KNOWI again, I was able to correlate the results of the semi-structured interview with (a) KNOWI Scale scores at the time of the laboratory session, (b) scores obtained 3-7 weeks earlier, and (c) an aggregate of the two.

Results and Discussion

The global ratings of the interview ranged from 1.0 to 7.0, with $M = 4.20$ and $SD = 1.65$. People with the highest scores recalled each of the three vignettes and cited them as possible evidence that the boyfriend is not apt to be there for his girlfriend. The global ratings showed substantial correlations with ratings on each of the individual vignettes: For "Job," $r = .72$; for "Vegetarian," $r = .76$; for "Dog," $r = .65$.

The global interview ratings were then correlated with scores on the KNOWI Scale. Following the method described above, the interview ratings were correlated with each participant's difference-score ($D_p - D_n$), partialling out the sum-scores ($D_p + D_n$). This calculation was performed twice, using the KNOWI data obtained (a) at the mass testing 3-7 weeks earlier and (b) at the end of the experimental session. In

both cases, $r = .41$, $p < .002$. (When the KNOWI scores from the two occasions were averaged, the value of r increased to $.45$, $p < .001$.) These results support my hypothesis that the knowledge structure assessed by the KNOWI Scale can be used to predict whether a participant is attentive and sensitive to cues in an interaction that indicate whether another person is likely to be there when needed. Since this laboratory interaction would seem to approximate a real-world dyadic interaction, the results support the hypothesis that people apply the knowledge assessed by the KNOWI Scale to actual social interactions.

In this study the participants had no advance warning that they would be asked about the boyfriend's being there when needed, yet some were very able to provide many relevant details. This result suggests that, for them, the knowledge structure was accessible, like a process continually operating in the background that enables a person to notice particular kinds of detail and answer questions during the subsequent interview. If a person lacked the knowledge structure, of course, this background process could not occur.

The results of this study help establish the predictive utility of the KNOWI Scale. Several factors, however, may have attenuated the size of the effect. First, the participants were interacting for the first time with a partner they had never met, to discuss people they did not know at all. Given such limited information based on a brief discussion, many participants indicated afterwards that they were reluctant (understandably) to draw inferences about the relationship that their partner described. It is possible that this reluctance was especially true for high-scoring individuals. Second, high- and low-scoring people may have had different expectancies about supportiveness (hence, different base-rates for judging its absence). For example, high-scoring participants may have had a vast store of prior

positive experiences and therefore expected others to be there for them when needed. Third, it is also possible that some high-scoring people did possess the relevant knowledge about being there, but, for idiosyncratic reasons (such as dysfunctional beliefs or defensive strategies), they did not (or could not) apply their knowledge. In some cases, people who possess the relevant knowledge may allow other factors (such as a partner's physical attractiveness) to upstage the partner's not being there.

Methodological Advantages of the Approach

Focusing on the knowledge structure is particularly advantageous in assessing individual differences. One of the major problems in assessment concerns response biases in self-report measures. For example, one kind of response bias, social desirability, is a prominent feature of many questionnaire items. However, by assessing *knowledge*, rather than self-description, I reduce the role of social desirability: The participant is merely asked to discriminate between two types of content. I assume, therefore, that the KNOWI Scale is not strongly affected by pressures to provide a positive self-description. However, other types of response bias may still exist, such as systematic differences among participants in their use of the rating scale—a “criterion bias”. Some people, for example, systematically rate all items high. By applying recent findings in the application of signal detection theory to the assessment of individual differences, my approach provides an additional control for these kinds of bias.

Limitations of the Method

The prototype methodology does have limitations as a method of identifying important indicators used to judge another person. For one thing, my method required nominators to produce indicators that can be expressed in words. Some

indicators, however, may be non-verbal—e.g., affect and other non-cognitive internal cues that are difficult to articulate. For example, Schwarz and Clore (1988), who have proposed an affect-as-information theory, have provided evidence that people use feelings to make evaluative judgments. That is, feelings seem to inform people about their otherwise implicit evaluations. The prototype methodology, which focuses on knowledge structures, assumes that the indicators generated constitute a representative sample of the total set of useful indicators. Further research is needed to determine the relationship between cognitive and non-cognitive cues and the relative power of each to affect people's final judgments in different situations (see, for example, Ottati & Isbell, 1996).

The prototype methodology has another limitation. I do not know how well the indicators obtained in these studies would generalize to other cultures. Further research is needed to evaluate the similarities and differences across cultures in the indicators used to judge a partner's being there.

Another methodological issue about the selection of items concerns the situations specified by the indicators: Do the situations need to be explicit about a need for social support? The indicator "stops by or calls when I am sick" does specify a stressful situation, whereas the indicator "knows how I feel about something even if I haven't explained it explicitly" does not. My procedure imposed no requirements of this type on the selection of items for the KNOWI.

Nor did my method control items systematically for the degree of risk implied (e.g., the risk of being rejected or criticized) when the person exposes a vulnerability. The item "remembers an upcoming stressful event I mentioned and asks me about it afterwards" implies that the person has disclosed a feeling of vulnerability and is placing the self at risk by revealing that feeling. On the other hand, "knows how I feel

about something even if I haven't explained it explicitly" implies no such risky self-disclosure. At a more abstract level, however, all items imply some risk. That is, people use specific indicators to make an *abstract and global* inference about the partner: "Does my partner have the ability and the motivation to be there when needed?" As a group, the indicators imply this higher-order risk: The partner may not have the motivation or the ability to be there on a long-term basis. Only by taking this risk can a person come to trust his or her partner to be reliably there in future stressful situations. In this sense, the indicators are the building blocks in developing trust in close relationships.

Chapter 5

Convergent and Discriminant Validity of KNOWI-accuracy

Introduction

A novel feature of the KNOWI Scale is its focus on a respondent's *knowledge*—knowledge about indicators of a partner's being there. Therefore, the KNOWI should be part of a nomological network of variables concerning knowledge about this construct. This nomological network of variables suggested the present study (Study 4) as a way of demonstrating the convergent and discriminant validity of the KNOWI Scale. I expected the KNOWI-accuracy scores to correlate with other measures of *knowledge* about support and responsiveness in close relationships, but not with variables that simply concern *properties* of relationships (e.g., "How sensitive is your partner?").

To evaluate the convergent validity of the KNOWI, I included two measures related to knowledge about being there. The first assessed a person's knowledge about indicators that a parent "is apt to be there" for a child. Since this measure, like the KNOWI, concerns *knowledge* about being there in times of need (in this case, a *parent* being there for the child), I expected it to correlate positively with the KNOWI.

Schachner et al., (2005) hypothesized that the processes in adulthood are similar to those in infancy: Just as a caregiver's sensitivity and responsiveness instill a sense of security in the infant (i.e., an expectation that the parent will be there when needed), a partner's sensitivity and responsiveness toward an adult should enable that adult to feel safe and secure. However, these authors have noted a lack of research on this process in adulthood: "Given that... expressiveness and sensitive responsiveness have been key constructs in attachment theory..., it is surprising how few studies of attachment relationships in adulthood have focused on . . . (the

caregiver's) skills and sensitivity" (p. 164). By including a measure of knowledge of responsive parenting, I intended to show how similar the construct of being there is in parent-child and adult-adult close relationships.

In addition, I administered the Sharing of Hurts Scale (Stevens & L'Abate, 1989). This measure is relevant because it focuses on the link between the two components of intimacy hypothesized by Shaver and Reis (1988): personal disclosure and responsiveness. This measure was of particular interest because it contains two kinds of items: Some emphasize the *knowledge* that certain characteristics are important or significant for a good relationship, whereas others simply state the *presence* of that characteristic in a relationship. An example of the first type of item (knowledge) is: "It's very important for me to know that he/she is receptive to all my feelings including the bad ones." An example of the second type (relationship characteristic) is "He/she can tell me when I have hurt him/her." Because, the KNOWI scores reflect knowledge, I hypothesized that participants' scores on the KNOWI Scale would correlate more highly with their ratings of the knowledge items of the Sharing of Hurts Scale than with their ratings of the relationship characteristic items.

The indicators contained in the KNOWI Scale are used to make causal inferences of a particular type, namely, inferences about a partner's ability and motivation to be there when needed. According to Fletcher, Danilovics, Fernandez, Peterson, and Reeder (1986), the general tendency to make causal inferences is characteristic of attributionally complex individuals. Their "Attributional Complexity" measure concerns a person's tendency to analyze and explain human behavior. Presumably, people with high scores on the KNOWI experience a greater sense of efficacy over this ability, and are therefore more strongly motivated to make causal

inferences about people. Also, the more they exercise their skill, the better they may become at making accurate inferences. I therefore expected scores on the KNOWI to be positively correlated with scores on the Attributional Complexity measure.

Three other measures were included to demonstrate the discriminant validity of the KNOWI Scale. Two of these measures do concern relationships, but they are not related to *knowledge* about being there, so they should not be correlated with the KNOWI Scale. One measure assessed a person's general discomfort in relating to others (Stanford Shyness Survey, Henderson & Zimbardo, 2002); the other assessed distress from interpersonal interactions (Inventory of Interpersonal Problems, Horowitz, Alden, Wiggins, & Pincus, 2000). I hypothesized that these measures are not related to scores on the KNOWI: Even though they assess the quality of a person's interpersonal relationships, they do not concern the specific *knowledge* that the KNOWI assesses. In addition, because the KNOWI assesses one type of social cognitive ability, I wanted to demonstrate that the results I obtained using the KNOWI Scale could not be ascribed to differences among the participants in their general ("academic") cognitive ability. For this reason, I administered two subscales of the Wechsler Adult Intelligence Scale (WAIS-III, Wechsler, 1997), namely, the Vocabulary and Similarities subscales. These subscales were selected because they are very highly correlated with the full scale IQ and because they are easy to administer.

Method

Participants

The participants in these studies were students in Psychology 1 classes at Stanford University, who participated as part of their course requirement. Their demographic characteristics were very similar to those described previously. These

participants included students who had completed questionnaires as part of a "Questionnaire Day," as well as students who had served in the laboratory studies. Every participant completed the KNOWI Scale as well as other questionnaires. Thus, the N's varied across subsamples, which differed in terms of the exact questionnaires that were completed. The subsamples ranged in size from 63 to 183 participants (see Table 2).

Measures

Six different measures were administered, three to demonstrate convergent (C) validity (Measures C1 through C3) and three others to demonstrate discriminant (D) validity (Measures D1 through D3). The three measures used to demonstrate convergent validity were the following:

C1. Knowledge about Responsive Parenting (Pederson, 1995; Elliott, Waters, & Gao, 2001). This 48-item measure was adapted from two existing measures by Pederson (1995) and Elliott, Waters, & Gao (2001) to assess a participant's knowledge about the indicators suggesting that a parent is apt to be there for the child in times of distress. The original measures, both Q-sorts containing relevant and irrelevant items, had been constructed by attachment researchers to assess whether observers judged parents to be responsive and available to their child. In order to adapt the measure for the purpose of assessing a participant's knowledge, I selected items that could be used to answer the question, "To what extent does this behavior suggest that the parent *will be there* for the child when the child has a problem or is upset?" In the present study the values of alpha for relevant items (valid indicators) and irrelevant items (invalid indicators), respectively, were .81 and .92. The scoring of this measure was similar to that of the KNOWI: First, I computed each participant's mean rating for the valid and the invalid indicators. Then I used the difference

between these two means (controlling for the sum) as an index of the participant's knowledge of the valid indicators.

C2. Sharing of Hurts (Stevens & L'Abate, 1989). This 24-item measure (not including the 4-item social desirability subscale) was designed to assess whether the partners in a relationship tend to "share hurts" with each other. The internal consistency in the present data was high; $\alpha = .90$. As noted above, I observed two kinds of items: Ten items assess the degree to which a person recognizes (that is, "knows") how important it is in a relationship that the partners share hurts with each other, whereas 14 other items simply note whether the partners do, in fact, share hurts in their relationship. I computed each participant's mean separately for each set of items. (In the present data, the Pearson r between the two was .74. Despite this high correlation, however, I expected the two kinds of items to correlate differently with the KNOWI Scale.)

C3. Attributional Complexity (Fletcher et al., 1986). This 28-item measure requires participants to rate themselves on items such as "I don't usually bother to analyze and explain people's behavior." It is said to measure the complexity of attributions about human behavior. In the present data, the internal consistency of this measure (α) was .90. I used the mean of the 28-item scale as an index of each participant's attributional complexity.

The three measures used to demonstrate discriminant validity were the following:

D1. Stanford Shyness Survey (Henderson & Zimbardo, 2002). This 35-item self-report measure is a general measure of shyness that emphasizes participants' social performance, including their performance with strangers. It has been shown to have good test-retest reliability and internal consistency. In the present data the

alpha was .90. I used the mean of the 35-item scale as an index of shyness.

D2. Inventory of Interpersonal Problems (IIP-32: Horowitz, Alden, Wiggins, & Pincus, 2000). This 32-item measure assesses a person's self-reported distress from various kinds of interpersonal problems, not necessarily in close relationships. It has good internal consistency and test-retest reliability. In the present data the alpha was .88. I used the mean of the 32 items to assess interpersonal distress.

D3. Subscales of the Wechsler Adult Intelligence Scale (WAIS-III, Wechsler, 1997). Two verbal subscales of the WAIS-III, the Vocabulary and Similarities subscales, were selected because they are very highly correlated with the full scale IQ (.84 and .81, respectively; Wechsler, 1997) and because they are easy to administer. Because preliminary testing showed that the early items were very easy for the participants in this sample, only the last eight items of each subscale were used. Participants' responses were scored (0, 1, or 2) according to Wechsler's scoring instructions and then summed separately for each subscale.

Results and Discussion

Convergent Validity

Associations between the KNOWI Scale scores ($D_p - D_n$) and other measures are presented in Table 2. As usual, the ($D_p + D_n$) sums were controlled in all correlations reported in the table. First, I expected scores on the KNOWI to be correlated with scores on the Knowledge of Responsive Parenting. (The KNOWI was administered during a mass testing at the beginning of the term, and the Knowledge of Responsive Parenting was administered in the laboratory at least three weeks later.) As can be seen in Table 2, there was a substantial association between the two measures ($r = .39, p < .001$). This finding was replicated with another sample (see footnote a in Table 2).

Table 2

Associations between the KNOWI-accuracy Scores and other Measures

Measure	Correlation with KNOWI- accuracy				Mean	SD	N
C1. Knowledge of Responsive Parenting ^a	.39***				1.87	1.15	139
C2. Sharing of Hurts – Knowledge Items ^b	.41***				6.58	.87	98
Sharing of Hurts – Non-knowledge Items ^b	.14				5.86	.97	98
C3. Attributional Complexity	.22*				4.89	3.82	94
D1. Stanford Shyness Survey	.01				2.60	.54	170
D2. Inventory of Interpersonal Problems (IIP-32)	-.03				1.23	.49	183
D3. WAIS-III Vocabulary	-.15				11.83	3.19	63
WAIS-III Similarities	.09				11.95	2.32	63

^a This finding was replicated in a second sample of participants (N = 96) who completed both tests during a mass testing. In that sample, $r = .41$, $p < .005$.

^b I also replicated these results, using data obtained on two different testing occasions three weeks apart. The association between KNOWI-accuracy and the “knowledge” items was $r = .39$ ($p < .001$) and that between KNOWI-accuracy and the “non-knowledge” items was $r = .17$ (ns). The difference between these two r s was significant; $t(95) = 3.29$, $p < .005$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The KNOWI and the Sharing of Hurts Scale were both administered during a mass testing. Scores on the Sharing of Hurts Scale were divided into those based on “knowledge” items and those based on “non-knowledge” items. These scores were then correlated with scores on the KNOWI—as usual, controlling for ($D_p + D_n$). As can be seen in Table 2, the partial r was .41 for the “knowledge” items ($p < .001$) but only .14 for the “non-knowledge” items (ns). The difference between these two r s was significant; $t(95) = 4.15$, $p < .001$ (using the formula proposed by Cohen & Cohen, 1983, concerning a test for the difference between two dependent r s). In addition, when I controlled for the “non-knowledge” items, the association between the KNOWI Scale and the “knowledge” items did not decrease; $r = .44$. However, when I controlled for the “knowledge” items, the association between the KNOWI Scale and the “non-knowledge” items was reduced ($r = -.24$). These findings were also replicated with another sample (see footnote b in Table 2).

These results indicate that scores on the KNOWI Scale are associated with those on the Sharing of Hurts measure, primarily because of items concerning the *knowledge about* the significance of sharing of hurts in relationships. Thus, they help establish the convergent validity of the KNOWI Scale.

As hypothesized, the KNOWI Scale had a small but significant correlation in the expected direction with the measure of attributional complexity ($r = .22$, $p < .05$). I believe that this correlation arises because people with high scores on the KNOWI experience a greater sense of efficacy in their judgments about others, and therefore are more strongly motivated to make attributions about other people’s behavior. It is also possible that high scorers on the KNOWI have become better at making correct inferences about potential partners because they exercise those skills more frequently.

Discriminant Validity

The other measures did not correlate significantly with the KNOWI Scale. The KNOWI was unrelated to measures of comfort (or distress) in social interactions. Its correlation with the Stanford Shyness Survey and that with the IIP-32 was not significant (see Table 2). Thus, the ability to discern valid indicators of a partner's being there seems to be a specific construct that is unrelated to ease and comfort in social situations.

In addition, the two measures of cognitive ability (the Vocabulary and Similarities subtests of the WAIS-III) were also unrelated to the KNOWI Scale in the present samples. Thus, intellectual ability does not seem to account for any of the relationships reported for the samples of this study.

In brief, these results support the convergent and discriminant validity of the KNOWI Scale. Perhaps the most important result is that KNOWI-accuracy correlates significantly with other measures that assess *knowledge* related to being there, but not with measures that assess interpersonal constructs unrelated to knowledge. Therefore, I conceptualize the index of KNOWI-accuracy as a measure of ability. This aspect of a person's responses to the KNOWI Scale—the “accuracy” of a person's responses—contrasts with another aspect—namely, the “elevation” of a person's responses. That aspect, which seems to be related to the person's motivation for support, is described in the following chapter.

Chapter 6

The Elevated Motives (ELMO) Effect:

KNOWI-Readiness and the Strength of the Attachment Motive

Introduction

According to my theory, prototypicality ratings may be used to assess the strength of a related motive. That is, an elevated (*attachment*) motive should lead to elevated *ratings* across all indicators on the KNOWI Task, on average. I call this hypothesis the elevated motives (*ELMO*) effect. In the present study (Study 5) I test the ELMO effect by demonstrating that the KNOWI-readiness index—the sum of a participant's ratings on *all* items (both high- and low-prototypicality items)—is related to the strength of a person's fundamental attachment motive. To demonstrate this relationship, I needed an independent measure of the strength of each person's attachment motive.

According to the hierarchical conception of motivational constructs, the attachment motive is itself subsumed under still higher-order constructs. Numerous studies have demonstrated that, at the top of the conceptual hierarchy, interpersonal motives may be classified into two broad abstract categories (see Horowitz et al., 2006). These two superordinate categories are called *communion* (connecting with other people) and *agency* (influencing other people). The two categories are often represented graphically as dimensions (X = degree of communion; Y = degree of agency) that comprise a two-dimensional interpersonal space.

Locke's (2000) Circumplex Scales of Interpersonal Values (CSIV) assesses the degree of importance respondents attach to each of eight categories of interpersonal goals. The eight scales form a circumplex (see Figure 3), organized around the two (orthogonal) interpersonal motivational dimensions—*communion*

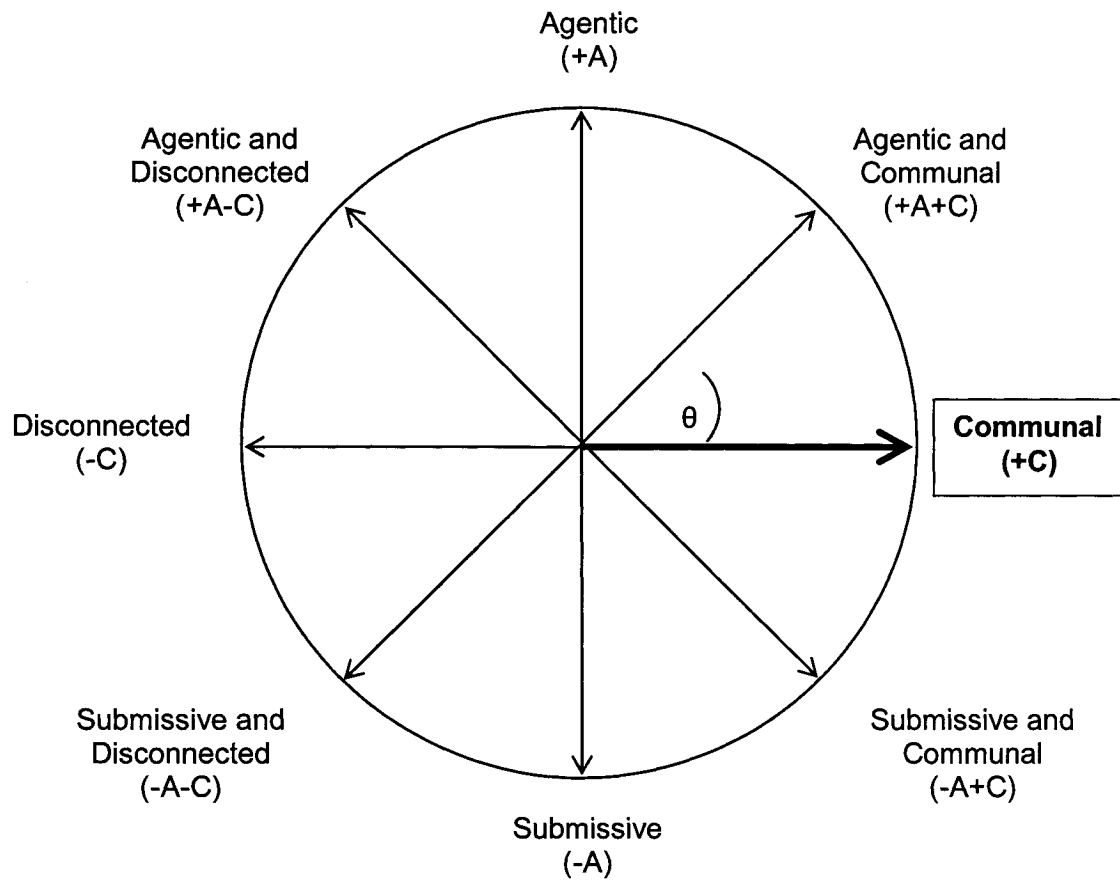


Figure 3. The circumplex structure of the eight scales of the CSIV.

(connecting with others) and *agency* (influencing others). Scales that are high in communion reflect the strength of the respondent's desire to connect with other people in a relationship. The scale that reflects the greatest degree of communion is the Communion Scale. Because the attachment motive is subsumed under the broad motive for communion, I hypothesized that the KNOWI-readiness would be significantly correlated with the Communion Scale of the CSIV.

One advantage of Locke's (2000) measure is that the eight scales of the CSIV reflect eight different regions of the two-dimensional interpersonal space formed by communion and agency. Theoretically, any interpersonal measure should show a predictable pattern of correlations, a "cosine curve pattern" (described below), with the eight scales (Gurtman, 1993). I could therefore test whether the KNOWI-readiness index shows this expected cosine curve pattern.

Would Locke's (2000) measure of communal motivation correlate with the readiness index from *any* rating task, even one based on an agentic motive? I think not, and wanted to demonstrate that KNOWI-readiness is motive-specific. Therefore, I needed to compare scores on the KNOWI-readiness with an analogous readiness index based on ratings from a task related to an *agentic motive* (self-enhancement)—hence, unrelated to communion. Paulhus has provided just such a task, the Overclaiming Questionnaire (OCQ), which assesses participants' knowledge of vocabulary (Paulhus & Harms, 2004; Paulhus, Harms, Bruce, & Lysy, 2003). The OCQ provides a list of words (e.g., scientific terms) containing real concepts as well as fake concepts (foils): Participants are asked to rate their familiarity with each term. From the participants' ratings of their familiarity with each term, two indices are computed; I call them "OCQ-accuracy" and "OCQ-readiness". The results showed that the OCQ-*accuracy* index predicts the participants' scores on a separate

intelligence test. In addition, the OCQ-*readiness* index was related to several measures of the self-enhancement motive. Apparently, people who are highly motivated to appear intelligent claim familiarity with many stimulus terms and therefore obtain a high OCQ-readiness.

In Study 5 I assessed two types of “criterion biases”—the KNOWI-readiness (ratings based on a communal motive) and the OCQ-readiness (ratings based on an agentic motive). Hypothesis 1 is that the KNOWI-readiness is associated with measures of the communal motive, but not with measures of the motive for self-enhancement. I expected the KNOWI-readiness—but not the OCQ-readiness—to correlate significantly with the Communion Scale of Locke’s (2000) CSIV. Hypothesis 2 is that the OCQ-readiness is associated with the agentic self-enhancement motive but not with the communal motive. I therefore expected the OCQ-readiness—but not the KNOWI-readiness—to correlate significantly with measures of self-enhancement. Finally, Hypothesis 3 is that the two types of criterion bias are themselves uncorrelated.

Method

Participants and Procedures

The participants were 231 students (135 women and 96 men) in Introductory Psychology classes at Stanford University, who participated as part of their course requirement. Their mean age was 20.6 ($SD = 1.73$). The sample included 109 Caucasian participants, 39 Asian American, 32 Hispanic, 24 African American, and 27 others. They completed the measures used in this study as part of packets that included many other measures. Thus, the N’s varied across subsamples on which different analyses in this study are based. The sub-samples ranged in size from 51 to

231 participants.

Measures

The Knowledge of Indicators (NOWI) Task (Turan & Horowitz, 2007). As described above, the NOWI consists of a mixture of good and poor indicators of a partner's supportiveness. The scale contains 11 good indicators, 11 poor indicators, and 19 filler items. Participants are asked to rate the degree to which each indicator increases their confidence that a potential partner "will be there for me at times of stress." Each participant's ratings are averaged separately for the good (G) and poorer (P) indicators. I define a participant's accuracy as the *difference* between that participant's two means and denote it ($G - P$). As noted previously, this difference score (NOWI-accuracy) obtained from continuous ratings is analogous to the number of hits *minus* the number of false alarms obtained from dichotomous judgments.

The NOWI-readiness index (criterion bias) reflects a greater readiness overall to judge an item to be a valid indicator of supportiveness. On the NOWI Task, which requires continuous ratings, the NOWI-readiness index may be assessed by the sum ($G + P$) of the ratings for all items (analogous to the number of hits *plus* the number of false alarms). In the present study Cronbach's α for the sum was .89. Study 2 showed that the test-retest reliability of the NOWI-readiness is satisfactory; $r = .69$.

The reader should note that, in my theory (as in signal detection theory), a high response readiness (or criterion bias) does not imply an inability to discriminate accurately between good and poor indicators. That is, accuracy (sensitivity) is logically distinct from response readiness. Consider two people, A and B, who differ in the strength of their motives: On an 8-point scale, suppose A uses low ratings

(e.g., 1 through 4), and B uses high ratings (e.g., 5 through 8). Either may be able to discriminate well or poorly. If they discriminate well, the low-motive person might use ratings of 1 and 2 (for poor indicators) vs. 3 and 4 (for good indicators); and the high-motive person might use ratings of 5 and 6 (for poor indicators) vs. 7 and 8 (for good indicators). If they cannot discriminate well, the low-motive person would simply rate all indicators—both good and poor—1 through 4; and the high-motive person, 5 through 8.

The Over-claiming Questionnaire (OCQ, Paulhus et al., 2003). Participants rate their familiarity with 150 words from 10 different categories (historical names and events, fine arts, language, books and poems, authors and characters, social science and law, physical sciences, life sciences, culture names, and philosophy). Each category includes 12 real words and three non-words (foils). Paulhus et al. showed that OCQ-accuracy is correlated with participants' intelligence, and the OCQ-readiness is correlated with a variety of measures of the self-enhancement motive (e.g., narcissism).

The Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988). The NPI, which was also used by Paulhus, Harms, Bruce, and Lysy (2003), is frequently used to assess individual differences in narcissism in non-clinical populations. It consists of 40 self-report items. Sample items are: "I like to be the center of attention" and "Modesty doesn't become me". In the present study, the NPI had good internal consistency; $\alpha = .94$.

Circumplex Scales of Interpersonal Values (CSIV; Locke, 2000). As described above, the CSIV contains 64 items describing different interpersonal goals—e.g., "that I feel connected to others". Respondents rate each goal on a 5-point scale to indicate its importance to them. The items are organized into eight

scales that form a circumplex within an interpersonal space composed of two dimensions, communion and agency (see Figure 3). Each scale represents a different combination of the two underlying dimensions.

Results and Discussion

As noted above, all statistical associations between variables and “readiness” scores were computed as partial correlations controlling for associated accuracy. First, I correlated the OCQ-readiness with narcissism; $r(N = 72) = .37, p < .05$. This result replicates Paulhus, Harms, Bruce, and Lysy’s (2003) finding. As I expected, however, the KNOWI-readiness was not correlated significantly with either the OCQ-readiness or with narcissism: For OCQ-readiness, $r(N = 65) = -.11, p > .40$; for narcissism, $r(N = 51) = .05, p > .70$. Thus, the KNOWI-readiness, in contrast to the OCQ-readiness, seems to be unrelated to self-enhancement.

I then correlated the KNOWI-readiness with the strength of various interpersonal motives assessed by the CSIV (partialling out KNOWI-accuracy). The Communion (+C) Scale of the CSIV is the purest measure of communal motivation (see Figure 3). The partial correlation between the KNOWI-readiness scores and the +C Scale was $r(N = 231) = .38, p < .001$. All other scales of the CSIV had lower correlations with the KNOWI-readiness.

Figure 3 shows the eight scales of the CSIV located in the two-dimensional space to form a circumplex. Each scale may be expressed in terms of its angular distance θ from the +C Scale. Theoretically, the greater the angular distance from the +C Scale, the less the scale has in common with the +C Scale (Locke, 2000). For example, the –C Scale is the most distant scale since it is diametrically opposite the +C Scale ($\theta = 180$ degrees): A high score on the +C Scale indicates the *presence* of communal motivation, whereas a high score on the –C Scale indicates the *absence*

of communal motivation. As other examples, the +A+C (Agentic and Communal) and the –A+C (Submissive and Communal) Scales each have an angular distance of 45 degrees from the +C (Communal) Scale.

The interpersonal theory has implications for the degree of correlation that each scale should show with an external variable (Gurtman, 1993). An external variable that one expects to correlate most highly with the +C Scale ought to show its lowest correlation with the –C Scale. Therefore, I expected the KNOWI-readiness to have its highest correlation with the +C Scale and its lowest correlation with the –C Scale. Other scales of the CSIV should show intermediate correlations with KNOWI-readiness: The greater their angular distance from the +C Scale, the lower the correlation should be.

The data supported this hypothesis. Figure 4 shows the correlations between the KNOWI-readiness and each of the eight scales of the CSIV (partialling out KNOWI-accuracy). The figure approximates a theoretical “cosine curve” that typically characterizes relationships among interpersonal variables (see Gurtman, 1993). As hypothesized, the strongest correlate of KNOWI-readiness was the +C Scale, and the magnitude of the correlation between KNOWI-readiness and the other CSIV scales depended upon their angular distance from the +C Scale, resulting in a cosine-curve pattern.

To further demonstrate the cosine-curve pattern, I computed the correlation between (a) the angular distances of the eight CSIV scales from the +C Scale and (b) their corresponding correlations with KNOWI-readiness. The resulting Pearson correlation was $-.96$. That is, there was a strong inverse relationship between the two properties of the CSIV scales—their angular distance from the +C Scale, and the strength of their association with KNOWI-readiness. In contrast, the correlation

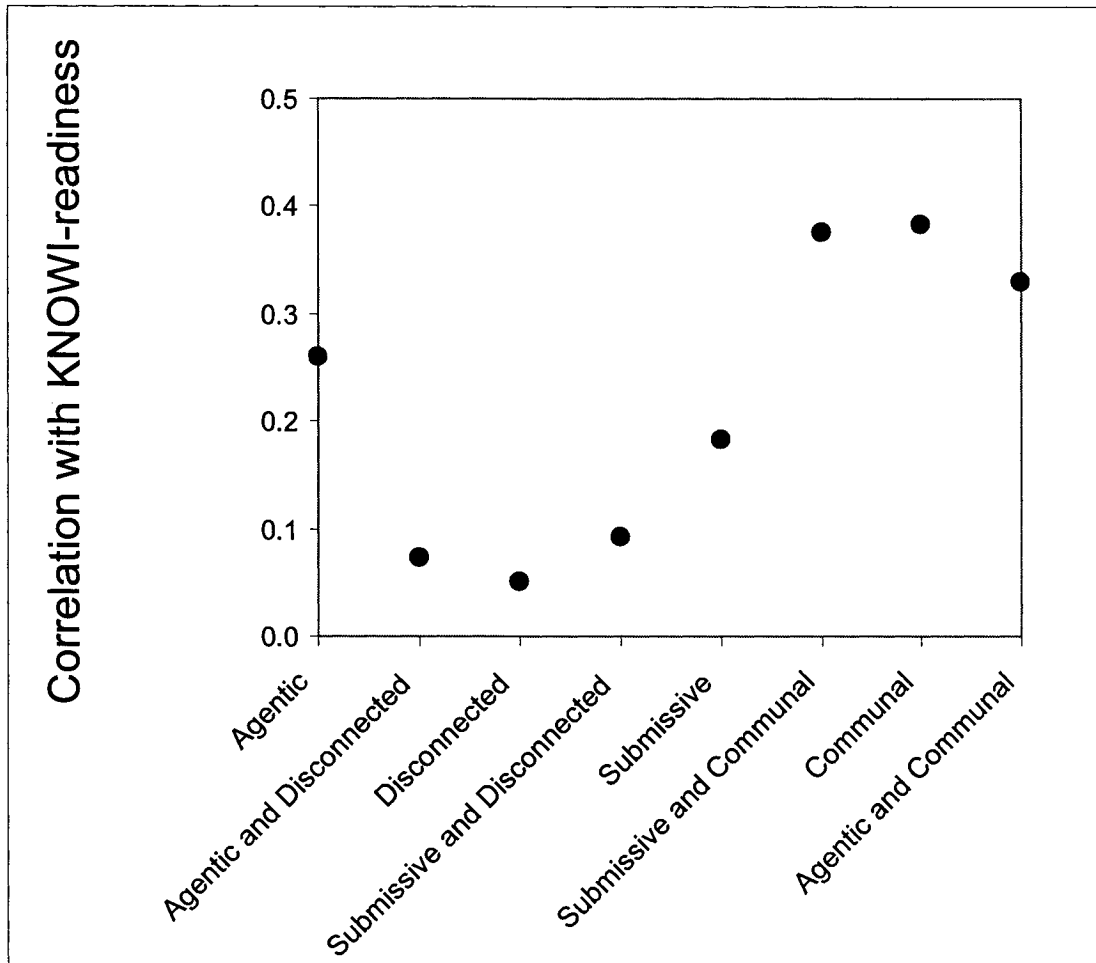


Figure 4. Correlations between the KNOWI-readiness scores and each of the eight scales of the CSIV. Correlations higher than .12 are significant at $p < .05$.

between the scales' association with KNOWI-readiness and their angular distance from the +A (Agentic) scale was only $-.07$. In brief, these results indicate that the KNOWI-readiness is an interpersonal variable that may be understood in terms of communal motivation. The results thus locate the KNOWI-readiness within a "nomological network" of variables (Cronbach & Meehl, 1955) formed by the eight scales of the CSIV—thereby establishing the *construct validity* of the KNOWI-readiness (Gurtman, 1993).

In contrast, the correlation between OCQ-readiness and the +C Scale (partialling out OCQ-accuracy) was not significant; $r(N = 62) = -.18, p > .15$. Thus, people with a strong motive to connect with other people produce generally higher importance ratings on all items of the KNOWI; but the strength of that motive does not predict their responses to the OCQ. The CSIV does not contain any one scale that assesses the specific form of motivation associated with narcissistic self-enhancement. The strongest correlate of the OCQ-readiness was Scale +A-C (agentic and disconnected), and the weakest correlate was the diametrically opposite Scale -A+C (submissive and communal; see Figure 5).

The results of Study 5 support the ELMO effect: People with a strong attachment motive generate relatively higher ratings, on average, for all indicators (high- as well as low-quality indicators). In addition, this study provides evidence for the convergent (and discriminant) validity of the KNOWI-readiness as a stable measure of one specific type of communal motivation. Together with earlier evidence regarding the validity of the accuracy index (Studies 3 and 4), the present results also suggest that the two indices of the KNOWI Task (accuracy and readiness, respectively) concern a person's knowledge and the strength of that person's communal motive for supportive partners. Therefore, the KNOWI Task has a very

valuable property: It allows a researcher to assess two important factors simultaneously, namely, knowledge and motivation.

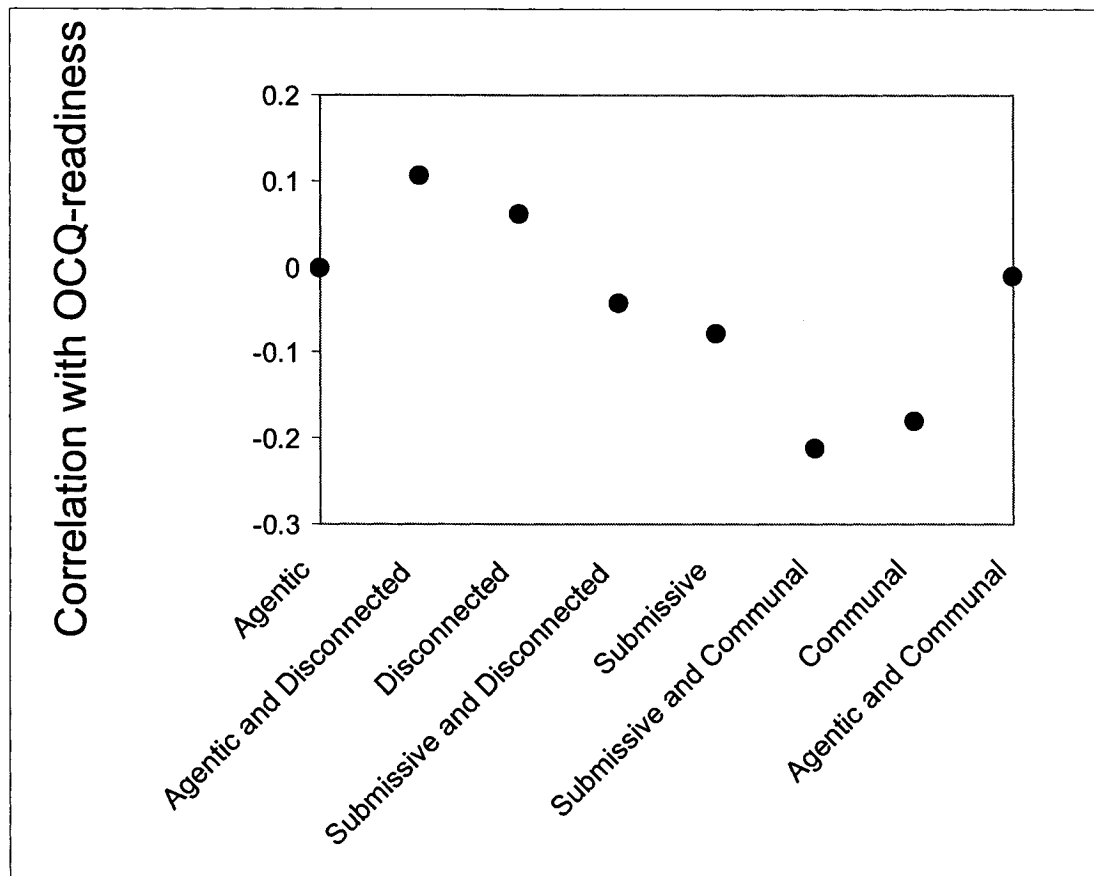


Figure 5. Correlations between the OCQ-readiness scores and each of the eight scales of the CSIV.

Chapter 7

KNOWI-Readiness Assesses What One *Wants*, Not What One Has:

An Experimental Demonstration

Introduction

According to the ELMO effect, KNOWI-readiness reflects a respondent's *motives and values*—e.g., “*It is important to me that my partner [does X]*”.

Theoretically, however, KNOWI-readiness would not reflect descriptive properties of a *current or specific* relationship—e.g., “My partner [does X]”. The Sharing of Hurts Scale (Stevens & L’Abate, 1989), a self-report measure, contains an intermingling of both types of items. Some items describe how much the respondent *values* (wants, attaches importance to) the sharing of hurts in a relationship, whereas other items *describe* a respondent’s current partner or relationship. The former type of items may be called “valuing” (motivational) items; the latter type, “describing” items. According to the ELMO effect, KNOWI-readiness should be associated with the valuing items, but not with the describing items. The Sharing of Hurts Scale therefore provides an ideal opportunity to test this hypothesis and demonstrate the convergent and discriminant validity of the KNOWI-readiness using a single instrument, the Sharing of Hurts Scale.

Furthermore, the distinction between “valuing” and “describing” items also suggested an experimental manipulation that would demonstrate convergent and discriminant validity using identical item content. That is, the very same item content could be presented under two different experimental conditions—a valuing condition and a describing condition. For this purpose, I selected the item content of the Secure Base Support Questionnaire (Cassidy & Woodhouse, 2003). This measure asks participants to report how supportive their current partner is (a “describing”

form). I also constructed a “valuing” form of the questionnaire by altering the instructions to create a “valuing” condition to be used in the present study (Study 6). This form asked participants to rate how much they value each characteristic of a partner. I hypothesized that the KNOWI-readiness would be associated with responses to the valuing form, but not with responses to the describing form.

Method

Participants

The participants were students in Introductory Psychology classes at Stanford University across several terms; they participated as part of their course requirement. Their demographic characteristics were very similar to those of the student samples in other studies. The measures were completed on a “Questionnaire Day” when packets were distributed that also included other questionnaires. Therefore, the N's varied across sub-samples on which different analyses are based. The sub-samples ranged in size from 117 to 155 participants.

Measures

The Knowledge of Indicators (KNOWI) Task (Turan & Horowitz, 2007).

This measure has been described under Study 2.

Sharing of Hurts (Stevens & L'Abate, 1989). This 24-item measure (not counting the 4-item social desirability subscale) was designed to assess whether the partners in a relationship tend to “share hurts” with each other. Ten items assess the degree to which a person *values* (a motivational construct) the sharing of hurts in a relationship. A representative item is “It’s very important for me to know that he/she is receptive to all my feelings including the bad ones.” I call these items the “valuing” subscale. In the present data Cronbach’s α for this subscale was .82. The other 14 items simply note whether the partner does, in fact, share hurts in their current

relationship (e.g., “He/she understands how vulnerable I am to his/her blaming me”); I call those items the “describing” subscale. In the present data Cronbach’s α for this subscale was .84. Theoretically, only the valuing subscale reflects a motivational construct, so I expected it—but not the describing subscale—to be related to the KNOWI-readiness.

The Secure Base Support Questionnaire (Cassidy & Woodhouse, 2003).

This measure contains 16 items that describe how well the current partner provides effective support for the participant. The items list qualities that a supportive partner exhibits, such as “Your partner accepts you”. In the current study I used two different sets of instructions. Participants in the describing condition were asked to rate the degree to which each item describes their most recent relationship partner. For the participants in the valuing condition, I changed the instructions to read: “In your opinion, how important are the following qualities in a romantic partner?” In the present data, Cronbach’s alphas for the valuing and describing conditions were .89 and .95, respectively.

Results and Discussion

Sharing of Hurts Scale

I hypothesized that the KNOWI-readiness would be associated with valuing support in relationships, but not with describing a current relationship. To test this hypothesis, I first entered the “valuing” (motivational) and “describing” (non-motivational) subscales of the Sharing of Hurts Scale into a regression equation predicting the KNOWI-readiness scores (the KNOWI-accuracy was also entered as a control variable). As expected, the valuing subscale was a significant predictor ($B = 1.09$, $t = 3.48$, $p < .001$), whereas the describing subscale was not ($B = -.07$, $t = -.26$, $p > .05$). This result supports my hypothesis that the KNOWI-readiness reflects a

motivational construct, not the characteristics of a specific relationship.

Secure Base Support Questionnaire

I entered the following variables into a regression equation predicting responses to this questionnaire: (a) Experimental Condition (*valuing* versus *describing* instructions), (b) KNOWI-readiness, and (c) their interaction (KNOWI-accuracy was partialled out of these variables). As expected, the interaction term was significant; $B = 2.51$, $t = 3.29$, $p = .001$, suggesting that the relationship between KNOWI-readiness and responses to the Secure Base Support Questionnaire differs for the two conditions.

I then examined the relationship between KNOWI-readiness and responses to the Secure Base Support Questionnaire separately for each condition by computing simple slopes for each condition (as suggested by Aiken and West, 1991). For the *valuing* condition, KNOWI-readiness was significantly associated with responses to the Secure Base Support Questionnaire; $B = .25$, $t = 2.31$, $p < .05$. This result further supports the hypothesis that the KNOWI-readiness reflects a motivational construct. Then I examined the slope for the *describing* condition to demonstrate that the KNOWI-readiness did not show a significant positive slope. Interestingly, the slope was negative: $B = -.26$, $t = -2.34$, $p < .05$. Apparently, participants who are highly motivated to receive support from their partner (high KNOWI-readiness scorers) report receiving *less* support from their partners.

How might this result be explained? It is possible that people with a strong motive for support have high standards in evaluating their partner's supportiveness. It is also possible that people whose current partners are not supportive come to value support all the more. In future research, it would be possible to administer both forms of the Secure Base Support Questionnaire—the *valuing* form and the

describing form—to a single sample of participants. In that case, I would expect the two forms to be negatively correlated. However, a comparable effect was not evident in the participants' responses to the “describing” subscale of the Sharing of Hurts Scale. Future research needs to replicate these findings and clarify the associated mechanisms.

To summarize, Chapters 6 and 7 have confirmed the ELMO effect, helping to validate the KNOWI-readiness as a measure of the strength of a person's motive for supportive partners. I have demonstrated the validity of the KNOWI-readiness index through both experimental and correlational methods.

So far, the ELMO effect has been applied only to the fundamental attachment motive and the KNOWI Scale. Can the effect be generalized to other motives and ratings of elements of a relevant prototype? To answer this question, I briefly interrupt my examination of the KNOWI Scale and the attachment motive to demonstrate the generality of the ELMO effect to another motive. In the next chapter I shall demonstrate that the ELMO effect can be applied to the domain of the intimacy motive. In that study I shall show a relationship between an elevated *intimacy motive* and ratings of the elements of a prototype of *intimacy*.

Chapter 8

Replicating the ELMO effect in the Context of Another Motive

Introduction

The studies so far have supported the ELMO effect with respect to the *attachment motive*: The sum of a person's ratings reflects the strength of the person's motivation. In the chapter that follows this one I shall continue applying the ELMO effect to show how the attachment motive relates to other phenomena. Before doing so, however, I depart slightly from the *attachment* theme in order to replicate the ELMO effect in the context of another communal motive, the motive for intimacy. This study (Study 7) demonstrated the generalizability of the ELMO effect by applying it to the intimacy motive.

First, I generated a prototype associated with the *intimacy* motive, namely, the prototype "*good ways to attain intimacy*". A prototype was generated listing concrete strategies that people use to satisfy the abstract intimacy motive. Then, participants were asked to judge the usefulness of each strategy for attaining intimacy. If the ELMO effect applies, then the sum of participants' ratings should be associated with the strength of their intimacy motive (assessed by other existing motivational measures). Study 7 tested this hypothesis.

Method

Participants and Procedures

Two samples of students at Stanford University participated as part of their course requirement. Their demographic characteristics were very similar to those of the student samples of other studies in this report. The measures were completed in class. Packets were distributed that also included other questionnaires. The first sample ($N = 72$ nominators) was asked to nominate good ways (concrete strategies

and goals) to attain intimacy. I adapted the procedure described by Fehr (1988) to identify all strategies that had been cited by two or more people: 48 indicators met this criterion. Examples include, “recall shared memories together”, “finish each other’s thoughts”, “share a secret together”, and “mourn a tragedy together”,

Participants in the second sample (N= 84 raters) were then asked to rate the usefulness of each strategy for “inducing a feeling of closeness or connectedness with another person”. The sum of a participant’s ratings across all strategies (“intimacy-readiness”) was computed. I hypothesized, by the ELMO effect, that intimacy-readiness reflects the strength of the person’s motivation for intimacy. The participants also completed the following motivational measures of intimacy.

Measures

Strength of the intimacy motive. Elliot, Gables, and Mapes (2006) have constructed a scale assessing people’s motive for deepening relationships (the Approach and Avoidance Social Goals Scale). One subscale contains four items that assess approach goals—e.g., “I try to enhance the bonding and intimacy in my close relationships” and “I try to deepen my relationship with my friends.” I used this subscale to assess the strength of each participant’s intimacy motive. In the present study Cronbach’s α was .71. The measure also contains a second 4-item subscale that assesses avoidance goals—e.g., “I try to stay away from situations that could harm my friendships” (α = .69). The authors showed that the avoidance goals are theoretically and empirically distinct from approach goals. I hypothesized that the avoidance subscale would be less relevant to the ELMO effect, because the ELMO effect concerns strategies for *increasing* intimacy (an approach goal), not strategies for preventing its loss.

The Boundary Questionnaire (Wilson, 2002). This questionnaire assesses the

degree to which a person likes to relax interpersonal boundaries (i.e., increase closeness with relationship partners). It contains 12 items ($\alpha = .88$ in the present study). Sample items include “I tend to put a lot of energy into relationships;” “I become close to people quickly;” and “When someone I am close to feels bad, I tend to feel bad too.” The Boundary Questionnaire was used as a second measure of the strength of participants’ intimacy motivation.

The Communion Scale of the Circumplex Scales of Interpersonal Values (CSIV; Locke, 2000). This scale was described in detail under Study 5. Only the Communion Scale (8 items) was used in the present study to assess the strength of participants’ communal motivation ($\alpha = .86$). I hypothesized that intimacy-readiness would be associated with scores on this scale since the intimacy motive is theoretically subsumed under the broader motive for communion.

Results

All results reported below supported my hypothesis, namely, that *intimacy-readiness* (the sum of ratings across all strategies) is associated with the strength of the participants’ intimacy motive (assessed by three different motivational measures). First, intimacy-readiness showed a significant correlation with the approach subscale of the Social Goals Scale; $r = .59, p \leq .001$. The avoidance subscale showed a smaller, but significant, correlation with intimacy-readiness; $r = .26, p \leq .05$. However, when both approach and avoidance subscales were entered into a regression equation, avoidance motivation was no longer a significant predictor of intimacy-readiness; $\beta = .07, t = .68, p = .50$. On the other hand, approach motivation was still a strong predictor of intimacy-readiness; $\beta = .57, t = 5.93, p \leq .001$. Thus, as hypothesized, the ELMO effect seems to arise in the context of an *approach* goal for intimacy.

Second, intimacy-readiness was significantly associated with scores on the Boundary Questionnaire; $r = .56$, $p \leq .001$. Third, as hypothesized, intimacy-readiness was significantly associated with communal motivation; $r = .46$, $\leq .001$. Thus, the results of Study 7 support the generalizability of the ELMO effect to the intimacy motive as well.

In the studies reported below, I now return to *the attachment motive* and examine how the ELMO effect can be used to assess motivation and further clarify how people satisfy the attachment motive.

Chapter 9

Two Indices of the KNOWI Scale Used Jointly:

The Interactive Effect of Knowledge and Motivation on Performance

Introduction

If people are to satisfy the fundamental attachment motive, they must first identify supportive partners. To do so, they must (a) possess relevant knowledge and (b) care about (i.e., want to have) attachment figures. The claim that motivation and cognitive ability jointly influence performance has been well documented in the area of *academic* achievement (Gagné & Fleishman, 1959; Hirschfeld, Lawson, & Mossholder, 2004; Vroom, 1964). The theoretical reason for this interaction is clear: A property of all motives is to mobilize existing resources to achieve corresponding goals. When performance is required, people with a strong motive certainly mobilize and apply their available knowledge (an important resource). But knowledge without motivation—and motivation without knowledge—are insufficient for enhancing academic performance. The study described next used two indices from the KNOWI Scale to assess (a) participants' knowledge (accuracy of discriminating between good and poor indicators) and (b) the strength of their motive for supportive partners (the magnitude of all their ratings). It examined the joint effect of the two indices upon performance.

Historically, the view that knowledge and motivation interact to affect performance dates back to studies of latent learning in animals (Tolman, 1948), which emphasized the joint effect of motivation and learned cognitions on performance. More recently, Lopes, Brackett, Nezlek, Schutz, Sellin, and Salovey (2004) have speculated that a similar interaction may exist between *social* knowledge and motivation in predicting *social* performance. Thus, people with a strong *motive* for

attachment figures should be more likely than others to mobilize and apply their existing *knowledge* in order to make correct inferences about potential partners. Therefore, in the present study (Study 8) my hypothesis was that knowledge (assessed by the KNOWI Task) interacts with motivation (assessed by Locke's measure) to affect a person's performance. Expressed differently, superior knowledge leads to superior performance in identifying supportive attachment figures *only when the person's motivation is sufficiently high*.

One property of a motive is that it mobilizes existing resources (e.g., knowledge) in order to achieve the desired outcome. Therefore, I hypothesized that the effect of knowledge on identifying supportive partners depends upon the person's level of motivation. I hypothesized that knowledge should predict superior performance only for participants with high levels of motivation. The rationale for this hypothesis is that a person who is not motivated to apply existing knowledge to a task would not benefit from that knowledge as much as a person who is highly motivated. Study 8 first examined this interaction using Locke's (2000) measure of motivation to assess the strength of the attachment motive. Then I examined an implication of the theory about the ELMO effect—namely, that the same interaction should manifest itself when the KNOWI-readiness is used to assess motivation.

Previously I reported a laboratory study (Study 3) that showed the value of *knowledge* (KNOWI-accuracy) in predicting social performance. In that study, each participant interacted with a confederate. The confederate described vignettes during their interaction that could be taken to indicate that her roommate's boyfriend had violated indicators of supportiveness. Participants high in KNOWI-accuracy were better able to detect and understand the significance of these cues. The present study reports additional data about the participants' motivation that allowed me to

examine the *joint effect* of communal motivation and knowledge. For this purpose, communal motivation was assessed in two ways—(a) with Locke's Communion Scale of the CSIV and (b) with the KNOWI-readiness index.

Method

Each participant interacted with a confederate, who described a personal problem involving her female roommate. In order to standardize the conditions across participants, the participants and confederates were all women. The participants were instructed to listen and react naturally to the confederate's problem. The problem description included subtle incidental details that could be taken to indicate that the roommate's boyfriend was not there for her. The study assessed the participants' sensitivity to these incidentally mentioned details (Turan & Horowitz, 2007).

Participants

The participants were 49 female undergraduate students enrolled in the Introductory Psychology course at Stanford University. Their mean age was 20.6 ($SD = 1.54$). Twenty were Caucasian, 13 Asian American, 6 Hispanic, 5 African American, and 5 others.

Confederates

The confederates were two senior undergraduate women. They memorized a prepared script and then practiced their role with approximately 20 pilot participants. Each pilot session was videotaped, and the two confederates and the first author watched the videotapes to refine the script and the confederates' performance.

Procedure

The participant, upon arriving at the laboratory, was introduced to her partner (the confederate). The experimenter then explained that the two of them would have

a conversation together in which one, selected at random, would describe a personal problem to the other. The confederate was always “selected” to be the person describing the problem. She was told to think of a problem that had arisen recently in her life. The participant by default became the listener. She was asked to listen and react naturally to her partner as though she were interacting with a close friend.

The problem that the confederate described concerned a recent difficulty with her roommate. The roommate had become distant and upset for reasons that the confederate did not understand. The confederate then proceeded to describe recent events in her roommate’s life. In the course of describing the roommate’s situation, she also mentioned that her roommate was in a new relationship with a boyfriend. The boyfriend was described in generally positive terms (e.g., “he is fun to be with”), but three brief vignettes that the speaker happened to mention all reflected violations of highly prototypic indicators from items of the KNOWI Task; that is, they revealed cues to the boyfriend’s not being there for his girlfriend.

The confederate and experimenter were both blind to the participants’ scores on the KNOWI Scale. The confederate adhered to the prepared script as closely as possible. She answered questions as briefly as possible and maintained a uniformly neutral acceptance of the participant’s reactions. The partners were allowed to continue their discussion for a maximum of 13 minutes.

Semi-structured Interview

After the interaction, the experimenter led the participant and confederate to separate rooms, where they each completed a questionnaire about their experience. Then the experimenter interviewed the participant about her interaction with the confederate. The interviewer asked successive questions that led the participant quite naturally to describe the partner’s problem, the roommate’s relationship, and the

boyfriend's characteristics: (1) To begin with, the interviewer asked the participant to describe the problem that the confederate had described. (From the participant's point of view, the interviewer did not know what the confederate had talked about.) This first question gave the participant a chance to tell the interviewer about the confederate's problem. After the participant had mentioned the roommate's boyfriend, the interviewer could legitimately ask about the boyfriend. The next two questions asked about the confederate—what she seemed to want from the interaction and whether the participant was able to help. These questions served to disguise the main purpose of the interview (namely, to inquire about the boyfriend's being there for the girlfriend). Then the interviewer asked what the participant thought of the roommate's relationship with her boyfriend and what kind of a boyfriend he seemed to be. The next question asked what the participant would do if she were in the roommate's shoes. Finally, to test the limits of the participant's understanding, the interviewer asked direct questions about the boyfriend's being there for the girlfriend: "Could the roommate go to the boyfriend about her problems?" and "Would he be there for her?" The entire interview was audio-taped.

Coding of interview. Three coders (the first author and two research assistants), all blind to the participants' scores on the KNOWI Task, listened to each tape recording and independently coded each interview using the following procedure. First, each of the three vignettes was rated separately on a 7-point scale. In order to obtain a high score, the participant had to remember details of the vignette and cite them as a possible indicator of the boyfriend's not being there. A low rating was assigned whenever a vignette was recalled without making any connection to the boyfriend's being there (e.g., citing a vignette to illustrate the boyfriend's positive qualities). Finally, the coders made one additional rating of the participant's *overall*

understanding using (a) the separate scores for the three vignettes as well as (b) other comments that the participant had volunteered. This final rating was used in the analyses reported below. The lowest possible rating indicated that a vignette was never cited as evidence of not being there—that is, either the vignettes were not mentioned, or a vignette was recalled as evidence of a *desirable* quality or without any support-relevant implication. The highest possible rating indicated that the participant remembered all three vignettes, recognized their significance, and drew a clear inference. These ratings thus reflect the participant's overall sensitivity to cues related to being there. The three raters' ratings were then averaged to yield a measure of each participant's ability to apply the knowledge. The inter-rater reliability was good; intraclass correlation = .93.

Measures

The Knowledge of Indicators (KNOWI) Task (Turan & Horowitz, 2007). Every participant had completed the KNOWI Task as part of a questionnaire packet administered earlier in the term.

Circumplex Scales of Interpersonal Values (CSIV; Locke, 2000). This measure has also been described under Study 5. In Study 8 I report only findings using the Communion Scale of the CSIV as a direct measure of communal motivation.

Results and Discussion

The participants' mean global ratings of the interview ranged from 1.0 to 7.0, with $M = 4.27$ and $SD = 1.64$. Using these ratings as a measure of each participant's performance in the interview, I hypothesized that a person's motivation for communion (desire to connect with other supportive people) affects the relationship between the person's knowledge about the indicators and the person's performance.

A regression analysis was performed, predicting interview scores from three sources—knowledge (KNOWI-accuracy), communal motivation (scores on the Communion Scale of the CSIV), and their interaction. Following the procedure recommended by Aiken and West (1991) both predictor variables were centered. This analysis yielded (a) a significant main effect for knowledge ($\beta = .34$, $t = 2.47$, $p < .05$ and (b) a significant interaction between knowledge and motivation ($\beta = .31$, $t = 2.26$, $p < .05$). The multiple R was .53; $p = .01$.

The significant interaction is shown graphically in Figure 6. Following the recommendation of Aiken & West (1991), I examined the effect when the participant's motivation was low—that is, when the Communion Scale score of the CSIV was 1 SD below the mean: In that case, knowledge was unimportant in predicting the participant's performance ($\beta = -.01$, $t = -.04$, $p > .90$). I then examined the effect when the participant's motivation was high—that is, when the Communion Scale score was 1 SD above the mean: In that case, knowledge was significant in predicting performance ($\beta = .70$, $t = 3.86$, $p < .001$). In other words, the results revealed an “aptitude by trait” interaction, where the “trait” was a motivational variable. Knowledgeable participants performed better only if they valued connection in relationships. In brief, knowledge seems to matter only when a person possesses a high degree of communal motivation.

This analysis demonstrated the effect of motivation on the knowledge-performance relationship using the Communion Scale of the CSIV as a measure of motivation. Once this effect had been established, I repeated the analysis using the *KNOWI-readiness* as a measure of motivation. The results of this second regression analysis are shown graphically in Figure 7; they were very similar to those of the first regression analysis. The interaction between the KNOWI-accuracy scores and the

KNOWI-readiness scores in affecting performance was significant ($\beta = .34, t = 2.45, p < .05$). The multiple R was .53; $p < .01$. When the participants' motivation was low (KNOWI-readiness score 1 SD below the mean), KNOWI-accuracy was unimportant in predicting the participant's performance ($\beta = .10, t = .50, p > .60$). However, when the participants' motivation was high (KNOWI-readiness score of 1 SD above the mean), KNOWI-accuracy was significant in predicting the participant's performance ($\beta = .89, t = 3.99, p < .001$). It is also worth noting that motivation alone did not compensate for a lack of knowledge in producing a good performance.

In brief, the same pattern emerged, no matter which measure of communal motivation was used (scores on the Communion Scale of the CSIV or the KNOWI-readiness scores). Like other important motives, the motive for support seems to mobilize existing resources to satisfy relevant goals. Why does motivation matter so much? Why do knowledgeable people with *strong* communal values (interests, wants) perform better on the laboratory task than knowledgeable people without such values? One of the consequences of motivation is that people attend selectively to motive-relevant stimuli and have better memory for those stimuli (e.g., McClelland, 1995; Schultheiss & Hale, 2007). I assume that people with strong communal values are more interested in interpersonal cues and processes, such as those in the laboratory task. Their greater interest would seem to affect their attention to, perception of, and memory for details of their interaction with the confederate. Figure 6 and Figure 7 also suggest that highly motivated participants with a severe deficit in knowledge (e.g., 2 or more SDs below the mean) may actually be handicapped by their strong motivation. High motivation combined with a severe lack of knowledge may have a disorganizing effect on performance. This interesting possibility needs to be examined further in future research.

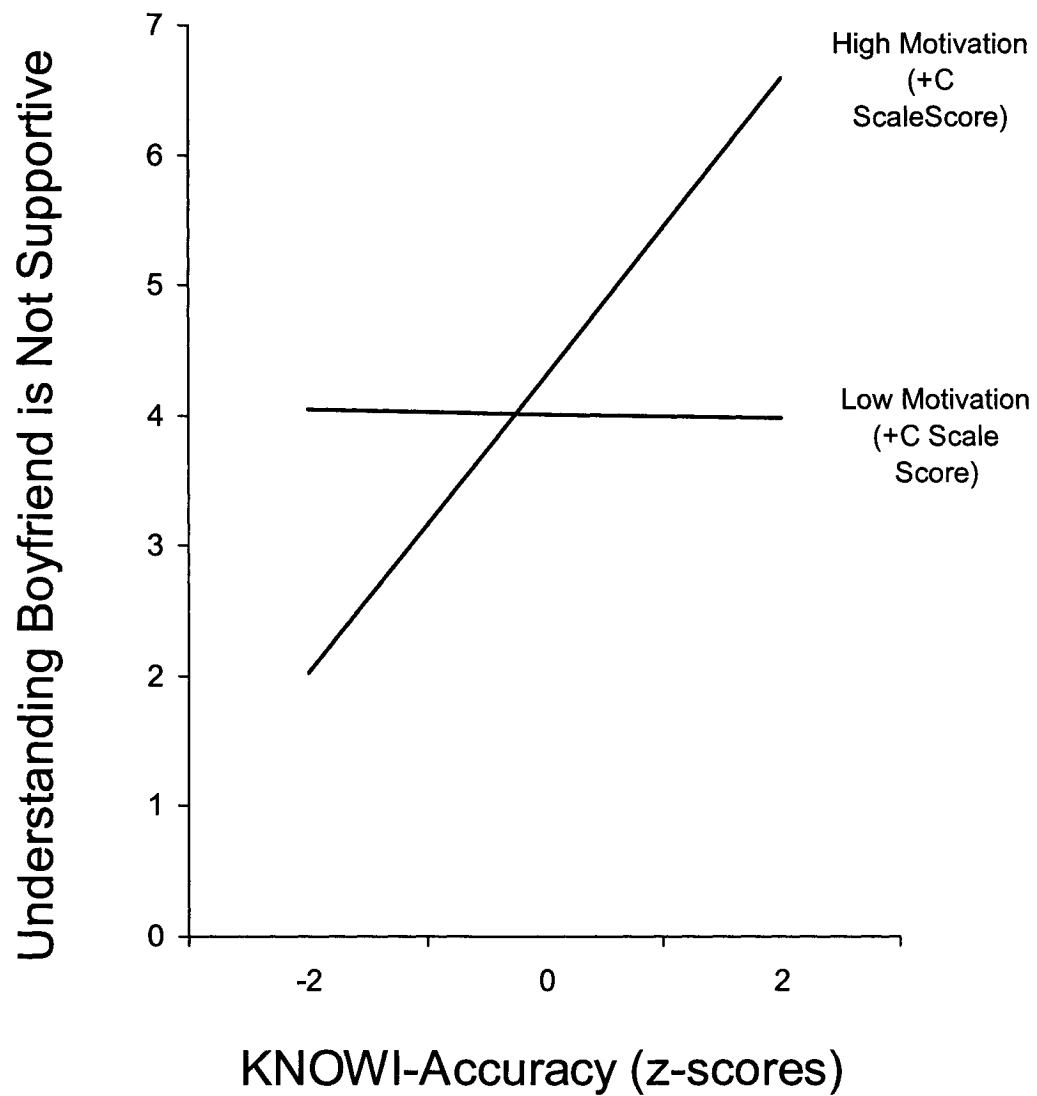


Figure 6. The relationship between KNOWI-accuracy scores and the interview scores are moderated by motivation as measured by the Communion Scale of the CSIV.

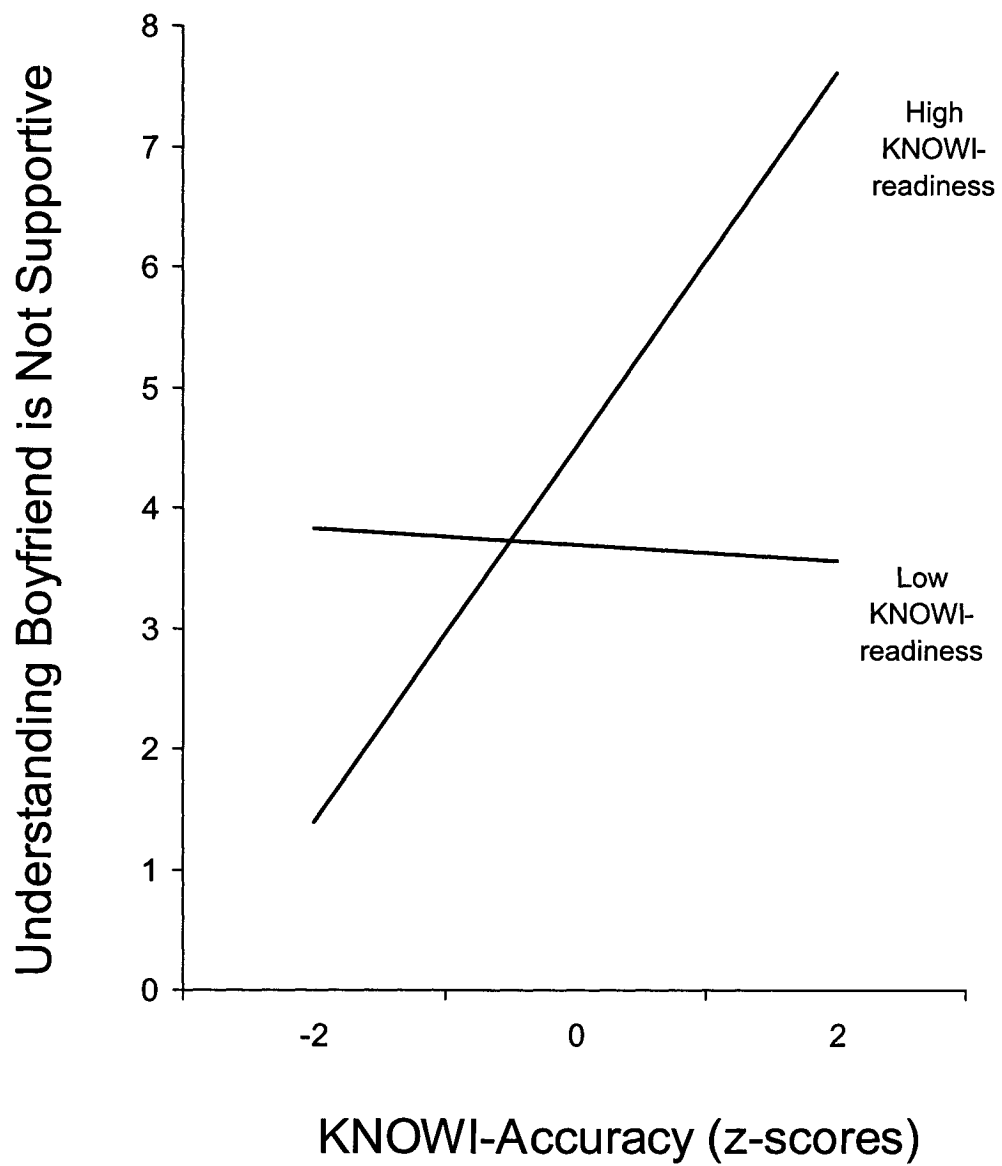


Figure 7. The relationship between KNOWI-accuracy scores and the interview scores are moderated by motivation as measured by the KNOWI-readiness scores.

In the present study, the motivational construct was assessed in two different ways—directly (using the Communion Scale of the CSIV) and indirectly (using the KNOWI-readiness). Some (but not all) items of the Communion Scale of the CSIV contain content that is relevant to the fundamental attachment motive. For example, some items of the CSIV ask participants to rate the importance of values such as “having other people stay with me when things aren’t going well” and “having other people show concern for how I am feeling.” In contrast, the KNOWI-readiness, as a measure of motivation, assesses a *by-product* of the relevant motive: Because highly motivated people are more familiar with many indicators (and therefore perceive many indicators to be useful), they obtain higher scores on KNOWI-readiness.

The KNOWI-readiness, as a measure of motivation, may have two advantages over direct measures of motivation. First, it is less transparent. Because participants are not asked directly about their motives, their responses are not likely to be affected by social desirability. Second, the meaning of the KNOWI-readiness necessarily concerns precisely the motive that is relevant to the domain assessed by the KNOWI-accuracy.

In the present study, both communal measures of motivation successfully predicted performance in the laboratory. The question therefore arose as to whether the KNOWI-readiness had predictive value beyond that of the CSIV. Therefore, I entered both interactions—(a) the interaction of the Communion Scale of the CSIV with KNOWI-accuracy and (b) the interaction of KNOWI-readiness with KNOWI-accuracy—simultaneously into the regression equation predicting performance in the interview. The main effects of (a) the Communion Scale of the CSIV, (b) KNOWI-accuracy, and (c) KNOWI-readiness were also entered as predictors. This analysis yielded a significant effect for the interaction between KNOWI-readiness and KNOWI-

accuracy ($B = .21, t = 2.05, p < .05$). However, the interaction between the Communion Scale of the CSIV and KNOWI-accuracy was no longer significant ($B = .59, t = 1.61, p > .11$). This result suggests that KNOWI-readiness has predictive value beyond that of the CSIV, which is a more transparent measure and less specific with respect to the motive to connect with others.

To summarize, the findings of Study 8 suggest that knowledge and motivation have an interactive effect on social performance. Knowledge seems to provide the skill or ability to succeed. However, without a strong motive to apply it, knowledge itself does not lead to optimal performance. Furthermore, the KNOWI-readiness, based on the same responses as the KNOWI-accuracy, is at least as good a measure of motivation as the Communion Scale of the CSIV for demonstrating this interaction. In addition, the study illustrates a way to assess both knowledge and motivation with a single instrument, the KNOWI. KNOWI-accuracy provides a measure of knowledge, and KNOWI-readiness provides a measure of the motive to apply that knowledge. In the next chapter, I shall use the KNOWI Scale to assess everyday behavior using an experience sampling method. The study will show whether motivation or knowledge (or both) affect the seeking of supportive others at times of stress.

Chapter 10

The Attachment Motive, the ELMO effect, and Behavior in Daily Life:

An Experience Sampling Study

Introduction

According to the theory I have presented, a person must first identify supportive attachment figures if the person is to satisfy the attachment motive. To do so, the person needs sufficient knowledge of indicators and sufficient motivation for support. A strong motive for support provides the person with a wide repertoire of experiences and indicators of supportiveness, leading to the ELMO effect. Then the person can form a relationship with promising individuals, and, when distressed, the person can approach those individuals for support. The present study (Study 9) concerns this final step of satisfying the attachment motive: seeking an attachment figure at times of stress.

If the sum of the ratings on the KNOWI (i.e., the KNOWI-readiness index) reflects the strength of a person's attachment motive (the ELMO effect)—and if a strong motive in turn energizes attachment-relevant behavior under stressful circumstances—then a person with high overall ratings should, in everyday life, more often seek contact with others when the person feels distressed (Bowlby, 1979; Collins & Feeney, 2000; Cutrona, 1986; Mikulincer, Gillath, & Shaver, 2002; Sroufe & Waters, 1977). That is, like other motives, a strong attachment motive should energize and direct relevant behavior (Baumeister & Leary, 1995; Brunstein, Schultheiss, & Grässmann, 1998; McClelland, 1987).

In Study 9 this hypothesis was tested using a *signal-contingent* experience sampling methodology. Participants received pagers, and they were randomly paged five times a day during a 7-day period. They recorded their emotions, thoughts, and

behaviors each time they were paged. In this way, I obtained data close in time to the participants' emotions, thoughts, and behaviors, thereby avoiding methodological problems associated with retrospective reports.

Method

Participants

The sample consisted of 152 participants (82 women and 70 men), who completed the KNOWI as part of a larger ongoing experience-sampling study of emotional experience (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000). They ranged in age from 18 to 94 years ($M = 55.1$, $SD = 20.4$). Forty-seven participants were African-American, and 105 were European American.

Materials

Experience sampling questions. Participants reported how intensely they were experiencing each of 19 different emotions every time they were paged (using a 7-point scale). The 19 emotions included 8 positive emotions (happiness, joy, contentment, excitement, pride, accomplishment, interest, and amusement) and 11 negative emotions (anger, sadness, fear, disgust, guilt, embarrassment, shame, anxiety, irritation, frustration, and boredom). For the present study, participants were also asked about their support-seeking behavior: "Since the last time you were beeped, did you talk to somebody about how you were feeling?" In this way, I could test the hypothesis that participants with higher motivation are more likely to seek support, especially when they are distressed.

Procedure

In the laboratory, participants were told that the purpose of the study was to examine emotions in everyday life. Then the procedures for the experience-sampling phase were explained, and participants were asked to respond to the questions each

time they were paged during the following week. In the weeklong experience-sampling phase, participants were paged five times each day between 9 a.m. and 9 p.m. (making a total of $7 \times 5 = 35$ occasions). The paging times were selected randomly, except that no participant was paged twice in a single 20-min period. After the participants completed the experience-sampling phase, they returned to the laboratory and completed the KNOWI Task and other measures as part of the larger study.

Results and Discussion

Theoretically, the fundamental attachment motive should manifest itself when a person is distressed and therefore in need of support (Bowlby, 1979; Collins & Feeney, 2000; Mikulincer, Gillath, & Shaver, 2002; Sroufe & Waters, 1977). For this reason, I wanted to demonstrate that people with high scores on the KNOWI-readiness are more apt to seek social support *when distressed*. To do so, I needed two pieces of information about each participant on each occasion—(a) whether the participant was distressed, and (b) whether the participant sought support. These two pieces of information were obtained in the following way: (a) By averaging a participant's ratings on all 11 negative emotions on a given occasion (time t), I obtained an estimate of that participant's distress level for that occasion. (b) Then I could examine whether or not that participant had talked to someone about his or her feelings (0 = no; 1 = yes) in the interval before the next occasion (time $t+1$). In this way, all such occasions could be identified for which the participant had talked to someone after having been distressed.

Following Carstensen et al. (2000), being distressed on a given occasion was operationalized as reporting a level of negative affect (averaged across all 11 negative emotions) that exceeded that participant's mean level of negative affect

across all 35 occasions. I identified occasions on which the participant was *more distressed than usual*. For each participant, I then computed the conditional probability that he or she had talked to someone, *given that* this participant had reported feeling *above* his or her own mean level of negative affect on the previous occasion.

The conditional probability of talking to someone when feeling more distressed than usual— $\Pr \{\text{Talk/Distressed}\}$ —was expressed as a proportion. That is, I computed the number of occasions on which participants had spoken to someone, expressed as a proportion of the total number of occasions on which they had been distressed. A similar proportion was computed to reflect the conditional probability of talking to someone on non-distress occasions— $\Pr \{\text{Talk/Not-Distressed}\}$ —i.e., when feeling equally or less distressed than usual. A paired t-test comparing $\Pr \{\text{Talk/Distressed}\}$ and $\Pr \{\text{Talk/Not-Distressed}\}$ revealed that participants, on average, were more likely to talk to others about their feelings when distressed than when not distressed; $t(172) = 2.72, p < .001$. Thus, on average, distress does seem to activate the behavior of contacting others to discuss current feelings.

My main hypothesis was that people with stronger motives for support are more likely to seek others' support when distressed. To test this hypothesis, I entered the KNOWI-readiness scores and the KNOWI-accuracy scores into a regression equation predicting $\Pr\{\text{Talk/Distressed}\}$. As hypothesized, the KNOWI-readiness was a significant predictor ($B = 2.53, t = 2.56, p = .01$). This result suggests that the strength of the motive to seek supportive others can predict actual support-seeking behavior.

Interestingly, the effect of KNOWI-accuracy was also significant ($B = 4.16, t = 2.39, p = .02$). This result suggests that people who possess knowledge about the

indicators are more likely to show support-seeking behavior. This finding, though not related to the motivational theme of this report, is not surprising because the knowledge of indicators (perhaps in combination with other attachment-related knowledge) would seem to be part of the general social skill that best equips a person to approach other people when in need of support.

Do participants high on KNOWI-readiness talk to others when distressed because they are generally more sociable (and therefore talk to others more often, even when they are not distressed)? The two conditional probabilities, $Pr\{\text{Talk/Distressed}\}$ and $Pr\{\text{Talk/Not-Distressed}\}$, were very highly correlated; $r(N = 152) = .77, p = .000$. I therefore wanted to remove their shared variance and demonstrate that KNOWI-readiness and KNOWI-accuracy still predict $Pr\{\text{Talk/Distressed}\}$. The results supported this hypothesis. Both KNOWI-readiness and KNOWI-accuracy predicted $Pr\{\text{Talk/Distressed}\}$ when $Pr\{\text{Talk/Not-Distressed}\}$ was also entered into the regression equation: For KNOWI-readiness, $B = 1.39, t = 2.16, p < .05$; for KNOWI-accuracy, $B = 2.49, t = 2.20, p < .05$. On the other hand, as expected, neither KNOWI-readiness nor KNOWI-accuracy predicted $Pr\{\text{Talk/Not-Distressed}\}$ when $Pr\{\text{Talk/Distressed}\}$ was also entered into the regression equation; both $ps > .35$.

These results suggest that the association between talking to others when distressed and KNOWI-readiness (or KNOWI-accuracy) is not simply due to a general tendency to talk to others about feelings (i.e., a general social orientation). Rather, this association seems to be specifically due to participants' desire to seek others to talk to about their recent distress. Analyses using Hierarchical Linear and Nonlinear Modeling (HLM; Raudenbush, Bryk, & Congdon, 2007) led to the very same conclusion: KNOWI-readiness and KNOWI-accuracy (between-person, or Level 2

variables) were significant moderators of the relationship between the two within-person (Level 1) variables—namely, being more distressed than usual at time t and talking to someone about one's feelings at time $t+1$. That is, participants high on KNOWI-readiness showed a stronger positive relationship between being distressed and talking to someone.

Thus, the KNOWI-readiness does identify participants who are motivated to talk to another person when they are distressed. However, these results concern the effects of the participants' motivation, not the reason for strong motivation in the first place: Some highly motivated participants may seek others for support because they have learned from experience that the contribution of supportive others can be—and often is—helpful (a strength). Other highly motivated participants, however, may seek others because they lack self-confidence to such a degree that they need reassurance of their acceptability from other people (a vulnerability). This point will be examined more closely in the General Discussion.

In brief, these results provide additional evidence that the KNOWI-readiness assesses the strength of the motive to connect with supportive others. Thus, the KNOWI-readiness predicts, not only performance in the laboratory, but also in everyday life.

Chapter 11

A Related Knowledge Structure:

Recognizing the Secure Base Script in Animated Film Clips

Introduction

The preceding 9 studies were all derived from a single knowledge structure, namely, good indicators of supportiveness in a potential partner. Individual differences in this knowledge structure have been assessed by the KNOWI Scale, and the KNOWI Scale has been used to provide two kinds of information about each respondent: the person's degree of knowledge (sensitivity to cues) and the strength of the person's fundamental attachment motive. I have shown that this type of knowledge structure (indicator-knowledge) is relevant to our understanding of attachment processes. Other types of knowledge structure also exist and help explain why some people are more successful at satisfying the attachment motive than others. Chapter 11 now examines another important type of knowledge structure, script-knowledge in the form of the secure base script.

Study 10 concerns the secure base script. Script-knowledge, in contrast to indicator-knowledge, concerns sequences or routines rather than prototypic indicators of a characteristic. To assess each person's script-knowledge, three different animations were constructed, each depicting geometric figures portraying the secure base script. These animations were presented to participants who were asked to describe what they thought was happening in each animation. A coding scheme was developed to score the extent to which each description incorporates the secure base script. These scores were used to measure the degree to which the secure base script is readily available to each participant and Study 10 showed that ready availability of the script affects processing of relevant information.

A person who has access to the abstract structure of the secure base script should be able to perceive the sequence of events that is common to all three animations. Therefore, participants were also asked to describe what they thought was the *common theme* in all three animations. The degree to which each participant could articulate the secure base script as the common theme constituted another measure of that participant's access to the secure base script. I hypothesized that the two measures of script-knowledge would be associated with each other.

In addition, Study 10 was designed to demonstrate that the material in the animations meets an important requirement for a script. That is, it affects how people process relevant information in predictable ways. For example, research has shown that people remember previously presented material better if they can rely on a script to mentally organize the material (Bower & Clark, 1969; Graesser, Hauft-Smith, Cohen, & Pyles, 1980). Therefore, I expected participants who are better able to recognize the secure base script to better recall details of the animations, because the organizing property of the script would help them find meaning in otherwise ambiguous movements in the animations. Similarly, participants who are better able to recognize the secure base script should be able to describe the animations in a more coherent and meaningful way. If the animations are indeed best understood in terms of the secure base script, descriptions incorporating that script would be better organized in terms of temporal continuity and causal connections.

Finally, I also examined whether a person's availability of the script is related to that person's degree of indicator-knowledge. Both knowledge structures would seem to be acquired through the same set of lifelong attachment experiences, so I hypothesized that the two measures of knowledge would be associated with one another.

Method

Participants

Participants (N = 53) were 28 men and 25 women, who responded to fliers around the Stanford University campus advertising a study on animations.

Participants' mean age was 20.9 ($SD = 5.7$). Twenty-four were Caucasian, 12 Asian American, 5 Hispanic, and 9 African American (3 participants did not indicate their ethnicity). Participants were paid \$10 each for their participation.

Animations (Film clips)

Three animations were created which depict simple geometric figures interacting with each other. Each animation, lasting exactly 30 seconds, portrays a clear example of the secure base script. During the initial construction, pilot testing suggested that some animations could be described using scripts other than the secure base script. That is, some participants described those animations using other plausible scripts. Therefore, those animations were modified so that the alternative description was no longer plausible. My goal was to create animations that are best interpreted as examples of the secure base script. I assumed that participants for whom the secure base script was readily available would favor that interpretation over less plausible interpretations.

In one animation, for example, a yellow triangle approaches other geometric forms—two circles and a rectangle (representing the play/exploration step of the secure base script, see Figure 8). After it touches the rectangle, the triangle starts to vibrate rapidly (i.e., a sign of distress). Then it approaches a larger (red) triangle, makes contact with it, and together they turn right and left (i.e., the small triangle is comforted by the attachment figure). Then, the small triangle goes back to the original geometric forms and touches them one by one (a return to exploration/play).

When it touches the rectangle this time, it does not vibrate; instead its tip stays in contact with the rectangle while the triangle turns about 45 degrees.

When presented out of context, the actions in the animations may be interpreted in different ways. For example, the rapid vibration of the triangle may be perceived as fearful trembling, laughing, or shaking hands. Indeed, those were all interpretations made by actual study participants. However, only one of these interpretations (fearful trembling) fits with other aspects of the animation if the participant is to view the animation as a sequence of events that comprise the secure base script.

Measures

The Knowledge of Indicators (KNOWI) Task (Turan & Horowitz, 2007). This task was described in detail in Study 2.

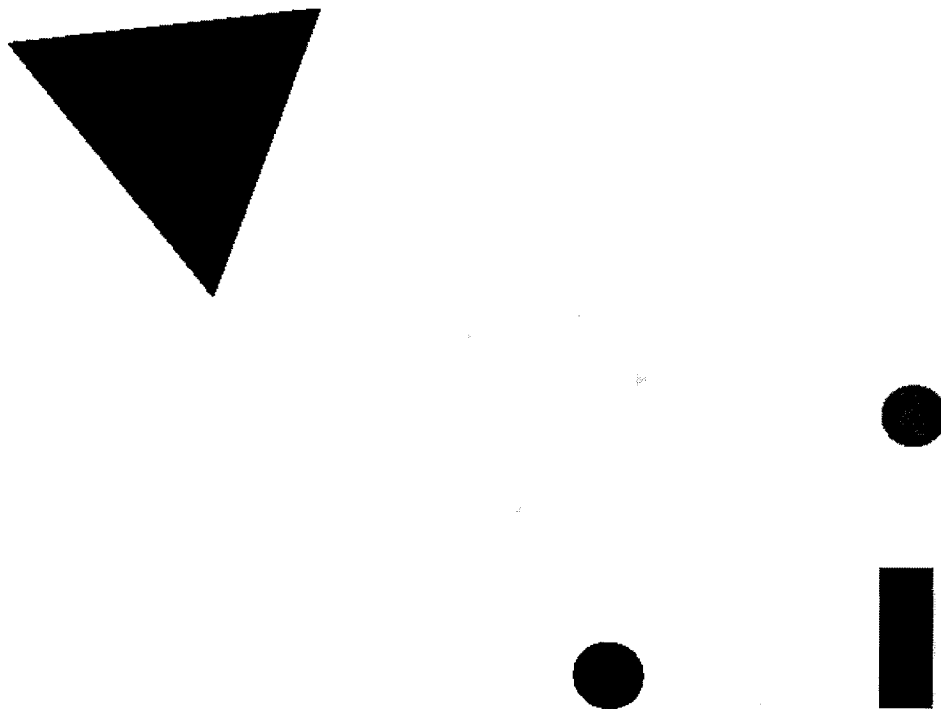


Figure 8. A sample animation depicting the secure base script.

Procedure

Participants were tested individually. Upon arriving at the laboratory, they received the following instructions: "You will see some short animated film clips with geometric figures. Imagine that each clip describes events in a common human experience. Later, I will ask you to type what you think is happening in the clip." Then, using a computer screen, the experimenter presented each animation twice. After the second viewing, participants received the following instructions:

What happened here? Remember to imagine that each clip describes events in a common human experience. Try to account for everything you saw in the clip, elaborating on the details. You have two minutes to type your response; that is what you thought the events were.

The experimenter then allowed the participant a maximum of 120 seconds to type his or her description using a second computer. If participants stopped typing before 60 seconds elapsed, the experimenter indicated that they could write more if they wished. The participants first practiced the entire procedure with a practice clip. Then they were given the three secure base animations in a fixed order. After they finished typing their description of the last animation, the experimenter asked them if they thought that there was a common theme to all three animations. The participants were allowed 120 seconds to type what they thought the common theme/story was. The participants were not allowed to re-examine their prior descriptions to individual animations as they worked on the common theme question.

Then the participants performed two interpolated activities that took a total of five minutes. The first was a memory task unrelated to the present experiment; the second was a questionnaire soliciting demographic information about the participant. Next, the experimenter instructed the participant: "Please write what you remember

from the clips. Describe *literally* what happened, e.g., the blue circle moved toward the red rectangle.” The participants received a printout of the first scene of each animation, and they had 90 seconds to type their recall responses for each animation. Then the participants performed another interpolated task unrelated to the present study, and finally they completed the KNOWI Task.

Coding the Responses

Coding the descriptions for the secure base script. A coding scheme was developed to score participants’ descriptions in terms of the degree to which they followed the secure base script. The coding scheme included a description of the steps of the secure base script and explained how each specific animation portrayed the script. Instructions were given to coders to specify under what conditions each of the scale points (1 – 7) should be assigned to a description.

In addition to me, two other coders (both senior undergraduate research assistants trained by me) independently rated descriptions for the three animations and responses to the common theme question provided by the participants. The ratings reflected the degree to which a description (or a common theme response) incorporated the secure base script. Interrater reliability was good; intraclass correlations for the three raters’ ratings were .97, .93, .95, and .96 respectively, for clips 1, 2, 3, and the common theme. The ratings for the description of each animation, averaged across raters, were then averaged across the three animations to provide an overall measure of the participant’s ability to recognize and apply the secure base script. (Cronbach’s alpha for the three clip descriptions was satisfactory; $\alpha = .64$). In addition, the ratings for the common theme were also averaged across the raters to provide a second measure of the same construct.

Coding the recall. First, two undergraduate research assistants independently watched each animation and identified each separate “action unit” that occurred in that animation. An example of an action unit was, “the yellow triangle moved toward the turquoise circle”. Then they compared their lists of action units and finalized the list of action units for each animation.

Two additional coders (both graduate students, who were not familiar with the concept of the secure base script or the hypotheses of the study) then independently read each participant's recall responses and, for each animation, counted the number of listed action units that the participant was able to recall correctly. Inter-rater reliability was good; intraclass correlations for the two raters were .85, .84, and .93 for animations 1, 2, and 3, respectively. These scores (number of action units recalled), were averaged across raters, and then averaged across the three animations to provide a measure of each participant's ability to recall literal details contained in the original animations. (Cronbach's alpha for the recall of the three clips was satisfactory; $\alpha = .77$.)

Coding for temporal continuity, causal connections, and organization of the original descriptions. If the animations are best conceptualized in terms of the secure base script, descriptions incorporating that script should be better organized in terms of temporal continuity and causal connections. To test this hypothesis, two additional undergraduate research assistants (both unfamiliar with the secure base script and the hypotheses of the study) coded the quality of the organization of the descriptions, using a coding scheme adapted from the one H. Waters and Hou (1987) developed. First, the coders rated the temporal continuity of the descriptions using a 3-point scale. Descriptions received high scores if there was a strong temporal order of the sentences so that if the order of the sentences were to be switched, the meaning of

the description would change substantially. Second, they counted the number of causal connections a description included. An example of a causal connection was: "The kid lost his ball, so he got upset". The count of causal connections included goal-directed behaviors such as the following: "Red pushes blue away because she does not want a relationship with him". Finally, the coders rated (using a 5-point scale) the overall organization of the descriptions by considering how many temporal and causal/goal-directed sentences the participant used.

Intra-class correlations were computed to examine inter-rater reliability on these ratings. Intra-class correlations ranged from .74 to .88 for the organization scores, from .78 to .86 for the causal connections, and from -.06 to .82 for the temporal connections. These intra-class correlations suggest that coders agreed well in scoring for organization and causal connections, but not in scoring temporal connections. Further analyses suggested that the reason for low inter-rater reliability in judging the temporal connections was due to lack of variability in these scores; almost all participants were able to describe the animations using a strong temporal order. Therefore, only results related to organization and causal connections will be discussed.

Results and Discussion

Description of Animations (Secure Base Coding)

The quality of the participants' descriptions of the animations varied substantially. Many participants recognized the secure base script in the animations and described the animation using this script. A sample response that received high scores from the raters was:

The yellow triangle might have been a child out exploring its surroundings, and when it touched the green rectangle, the rectangle hurt or upset the child,

so it ran to its parent (the red triangle). The triangle comforted it and the child started to explore again.

Surprisingly, however, not everyone seems to have ready access to the secure base script. Some participants could not see any meaningful story depicted by the animations. For example:

It was very hard for me to tell what the activity in this clip was... for some reason I got the impression that the yellow triangle was a car, but it wasn't doing any car-like activities (although going between the circles looked sort of like trying to park). I don't know what the shaking and the meeting the red square would have been though.

Still other participants could tell a story, but that story did not incorporate the secure base script at all. A sample response that received low scores from the raters was:

Yellow says hi to light blue then goes to say hi to dark blue. Then it goes to green and starts laughing a lot. It turns to dark blue and laughs with it, too. Soon, yellow and red meet up and share a hug. Then yellow goes back and says goodbye to the blues and green.

An example of a common theme that received high scores from the raters was:

The common theme was that there was a child who was playing while the mother looked on. The child was young and still dependent on the mother. The mother would not be involved in the child's play until something happened that disrupted the child's play or frightened the child. When the child was hurt, tired, or frightened, it would go to the mother where the mother would comfort the child until it felt ready to return to playing. Then the mother would continue to watch the child from afar.

An example of a common theme that received low scores from the raters was:

There was a common theme of some individual having dominance over another/others. This dominance might have been throughout the entire clip, or it may have shifted between individuals during the clip. This dominance seemed to be one of a physical dominance largely, and it was often of an individual using it to take advantage of another.

The mean scores for the description of the three animations (reflecting the degree to which the descriptions followed the secure base script) showed considerable variability, ranging from 1.0 to 6.2 ($M = 3.4$, $SD = 1.6$). Similarly, the common theme scores ranged from 1.0 to 7.0 ($M = 3.3$, $SD = 2.0$). As expected, these two measures correlated very highly with each other, $r = .79$, $p \leq .001$, suggesting that they assess the same construct (ready availability of the secure base script).

Recall of animations

On average, participants recalled about half of the action units ($M = .55$, $SD = .12$, for the proportion of action units correctly recalled). As hypothesized, the proportion of the action units that the participants recalled were correlated significantly with both measures of their ability to recognize the secure base script: $r = .56$ with the mean of the three clip scores, and $r = .57$ with the common theme score (both $ps \leq .001$). I also examined each animation separately, computing correlations between recall of the action units of each animation and the degree to which the description of that animation followed the secure base script. These correlations were $r = .31$ ($p < .05$) for animation 1, $r = .50$ ($p < .001$) for animation 2, and $r = .48$ ($p < .001$) for animation 3. These results further suggest that participants who were better able to recognize the secure base script were also better able to recall literal

elements of the animated film clip. Thus, the organizing property of the script seems to help a person retrieve details of an otherwise ambiguous stimulus.

Causal Connections and Organization

I obtained Pearson correlations between scores on the overall organization of the descriptions and the measure of secure base script knowledge (secure base scriptedness scores of the descriptions) separately for each of the three animations. These correlations were .59, .49, and .69, respectively for animations 1, 2, and 3 (all p 's < .001). Similarly, correlations between secure base scriptedness scores and causal connection scores were .63, .50, and .74, respectively for animations 1, 2, and 3 (all p 's < .001). Thus, participants who could recognize the secure base script in the animations provided descriptions that were better organized.

Thus, results of Study 10 suggest that some people have access to a well delineated knowledge structure, (in this case, script-knowledge), which can be summarized as the secure base script. Many participants could recognize the script simply from the sequence of events depicted by geometric figures, which do not include any human content. Participants could also recognize the higher-order abstraction from structural similarities among the three animations. The recognition of this abstract script structure, in turn, seems to shape how they organize their perceptions of the stimuli in the animations, affecting their memory for these stimuli and the organization of their descriptions of the animations. These results suggest that having a ready access to the secure base script may shape how people process support-relevant information in their everyday lives—how they interpret and remember supportive efforts of relationship partners and how they make global judgments about partners.

Script Knowledge and Indicator Knowledge

As hypothesized, both measures of ready availability of the secure base script were significantly associated with the KNOWI-accuracy scores (controlling for KNOWI-readiness); $r = .36$ and $r = .35$, respectively, for the mean of the three clip scores and the common theme score (both $ps \leq .01$). This result supports the hypothesis that people with greater knowledge about indicators of a supportive partner (high scores on KNOWI-accuracy) are better able to recognize the secure base script, suggesting that these two knowledge structures are related, perhaps because they are part of a higher-order cognitive structure related to attachment processes. However, the correlation between the two types of knowledge is not so high as to preclude strong knowledge of one and weak knowledge of the other.

I also entered KNOWI-accuracy, KNOWI-readiness, and the mean of the three secure base animation scores simultaneously into a regression equation predicting participants' recall of animations. The mean of the three secure base animation scores was still a significant predictor; $\beta = .55$, $t = 4.29$, $p < .001$. However, neither KNOWI-accuracy nor KNOWI-readiness had significant effects; both $ps > .5$. (Results were very similar when I used the common theme score instead of the mean score for the three secure base animations.) These results suggest that even though the two components of the internal working models of attachment are related, they may be used to make unique predictions related to their distinct domains.

In brief, results suggest that knowledge structures concerning attachment processes may have important consequences in people's close relationships. In addition, there was a significant association between the participants' access to the secure base script and their knowledge of the indicators of a partner's supportiveness, suggesting the existence of a higher order knowledge structure about attachment processes.

Both knowledge structures help a person evaluate the likelihood that a partner will provide effective secure base support. Indicator-knowledge concerns the organized behavior patterns and traits that a supportive person exhibits, and script-knowledge articulates the prototypic sequence of events that constitute the situations in which those behaviors get expressed. In other words, script-knowledge enables a person to evaluate an attachment figure's behavior patterns and traits in context—i.e., the person-by-situation interaction (Idson & Mischel, 2001; Zuroff 1982). As Holmes (2002) has noted, "One can only identify the *person* as a figure against the ground of the situation" (p. 8). Thus, indicator-knowledge would seem to be a trait-like aptitude that is needed for identifying support-providers. But script knowledge allows a person to know the context (situation) in which a support-provider might be expected to exhibit support.

Chapter 12

Accessibility of the Secure Base Script and Attachment Security

Introduction

In the final study of this dissertation, I examined the relationship between indicator-knowledge, script-knowledge, and attachment security. Study 11 had two aims: (a) to replicate the results of Study 10 in order to test their generalizability and (b) to relate the two attachment-relevant knowledge structures to earlier studies of attachment security. Would a secure attachment facilitate the acquisition of such knowledge? On the one hand, having access to relevant script-knowledge and relevant indicator-knowledge might increase a person's effectiveness in (a) evaluating another person's supportiveness, and (b) effectively obtaining support from others. On the other hand, early disappointments in life and an insecure attachment may sharpen and direct a person's attention to processes related to attachment. I was therefore curious, as the final step, to examine the relationship between the quality of each type of knowledge and the person's attachment security. In Study 11, I therefore administered a conventional attachment measure, along with the various measures of attachment-relevant knowledge.

I hypothesized that people with an avoidant attachment style would not have ready access to the knowledge structures examined in this article because their chronic avoidance of thoughts, discussions, and interactions related to secure base support would limit their acquisition of knowledge. The relationship between attachment anxiety and knowledge is less clear. On the one hand, anxiety may be associated with reduced access to knowledge structures because anxiety depletes mental resources as the person constantly monitors other people's supportiveness. On the other hand, other people's supportiveness is important to anxious people.

Therefore, they may have acquired more articulate knowledge structures, which they come to access frequently and with ease.

I argue that knowledge about attachment processes and attachment security are distinct constructs: To be labeled as securely attached, a person needs additional capacities besides having access to two of a possible class of relevant knowledge structures—positive expectations, trust, motivation for receiving support, and habitual interpersonal patterns. For example, a person who has ready access to the relevant knowledge may not exhibit a secure attachment pattern because of little desire for support or because of a fear of losing a partner. In addition, the person may expect everyone to be unsupportive as a result of previous experiences. Such factors may interfere with (or overshadow) the application of existing knowledge. Therefore, Study 11 examined the separate roles of generalized expectations and motivation for support in secure attachment.

In addition, Study 11 tested the generality of the findings of Study 10 in three ways. First, in Study 11 the three secure base animations had been presented in uninterrupted succession. The presentation of only secure base animations enabled me to ask the participants later if they noticed a common theme in the animations. However, it is possible that this cumulative exposure to the script in successive animations was critical for producing the results. One goal of Study 11 was therefore to demonstrate that the animations do not need to be presented in immediate succession. Second, it is possible that the animation task simply assesses a general ability to impose human qualities onto geometric forms (even when the content of the animation is unrelated to the secure base script). Therefore, Study 11 assessed and controlled for this kind of ability. Third, the KNOWI Task in Study 10 had been administered in the laboratory immediately after the animation task, possibly

augmenting the effect. Therefore, it was important to demonstrate that the results did not depend on the simultaneous administration of the two tasks.

To address these issues, the procedure was modified in Study 10. Three “control” animations were interspersed among the experimental (secure base) animations. These animations served as control stimuli depicting scripts other than the secure base script—e.g., a game or a race between people. The participants’ responses to these control stimuli were used to assess each participant’s ability to create stories describing how geometric figures might interact in human-like ways. It was then possible to determine whether the participants’ performance on the secure base animations was related to their indicator-knowledge of supportiveness (scores on the KNOWI Task), controlling for their ability to describe animations in human-like ways. In addition, the KNOWI was administered several weeks before the laboratory session.

Method

Participants

The participants were 119 undergraduate students enrolled in the Introductory Psychology course at Stanford University. Seventy-four of them were female and 44 were male (one did not report gender). Their mean age was 19.4 years ($SD = 1.37$). Fifty-five were Caucasian, 26 Asian American, 15 Hispanic, and 6 African American (17 participants did not report their ethnicity). Every participant had completed the KNOWI Task as part of a questionnaire packet administered early in the term.

Animations

There were four secure base animations (clips)—the three used in Study 10 (slightly modified) plus a new one. In addition, three control animations were constructed. Each control animation depicted the sequence of events making up a

different script—one animation was about a footrace, another about the game “duck, duck, goose”, and a third depicted the story of “the hare and the tortoise”. The control animations were constructed in such a way that they were comparable to the secure base animations in their clarity in representing the underlying script.

Procedure

Participants were tested individually using procedures similar to those in Study 10. First, they watched a practice animation, then a secure base animation, then a control animation. Subsequent stimulus clips alternated between secure base and control animations. After viewing an animation twice, the participants described what they thought was happening. The instructions were identical to those used in the previous study. The participants had 90 seconds to type their responses.

Coding of the Descriptions for Secure Base Scriptedness

Three coders rated descriptions of the secure base animations, using the same coding scheme as in Study 10. The ratings reflect the degree to which a description was judged to incorporate the secure base script. The interrater reliability was good; intraclass correlations ranged from .92 to .97 for the four secure base animations. The three coders' ratings were then averaged for each animation. In the analyses below, each participant's mean score for the four secure base animations was used as a measure of that participant's access to the secure base script. Similarly, three coders independently rated how well the participants could recognize the different scripts depicted in the control animations. Intraclass correlations ranged from .94 to .98 for coders' ratings on the descriptions of the three control animations. These ratings were then averaged across the three control animations and across the three coders to obtain a measure of each participant's general ability to recognize scripts in this type of animation. It should be noted that, participants almost never

used the secure base script in describing the control animations, indicating that script-knowledge is domain specific.

Coding for Causal Connections and Organization

Two undergraduate research assistants (neither had participated in coding the descriptions in terms of the degree to which they followed the secure base script) coded the quality of the organization of the descriptions (adopting the coding scheme developed in Study 10). First, they counted the number of causal connections a description contained. Then, (using a 5-point scale) they rated the overall organization of the descriptions by counting how many temporal and causal/goal-directed sentences the participant had used. To examine inter-rater reliability on these ratings, intra-class correlations were computed, which ranged from .80 to .86 for the organization scores, and from .82 to .89 for the causal connections.

Coding for the Number of Action Units Used in Describing the Animations

Secure base animations had been created so that the most plausible (and most frequent) description of these animations resembled that of the secure base script. I wanted to determine how much of the actual content of each animation had been used by each participant in describing a secure base animation. First, two coders (both undergraduate students) identified each separate action unit (element) that occurred in each animation. Then, the coders independently read each participant's descriptions of the animations and, for each animation, counted the number of action units that the participant had used in describing the animation. Inter-rater reliability was good; intraclass correlations for the two raters were .97, .71, .83, and .98 for the four secure base animations. These ratings were then averaged across the two raters to obtain a measure of the number of action units each participant had used in describing each of the secure base animations.

Coding for Distortions in the Secure Base Animations

The coders also counted the number of times participants distorted an element in describing an animation. For example, if a participant stated that one geometric figure held hands with another, when in fact the two figures were never in contact, this description of holding hands would be coded as a distortion. Intra-class correlations for the two coders were .94, .79, .77, and .99 for the four animations, suggesting good interrater agreement.

Measures

The Knowledge of Indicators (KNOWI) Task (Turan & Horowitz, 2007). Every participant had completed the KNOWI Task (described in detail under Study 2) as part of an assessment packet administered earlier in the academic term. The accuracy index (KNOWI-accuracy) assesses participants' knowledge of the indicators of supportive people. The response readiness index (KNOWI-readiness) reflects the strength of the participants' motivation for supportive relationships. Both indices were used in the present study.

Experiences in Close Relationships (ECR; Brennan, Clark, & Shaver, 1998). The 36-item ECR is widely used to assess the two dimensions of attachment, namely, anxiety and avoidance. An item of the anxiety scale is "I worry about being abandoned", and an item of the avoidance scale is "I try to avoid getting too close to my partner". A subset of participants ($n = 61$) completed the ECR as part of a questionnaire packet administered early in the term. In the present data, both scales showed good internal consistency; $\alpha = .93$ and $\alpha = .89$, respectively, for the avoidance and anxiety scales.

Generalized Expectations for Support. This measure was constructed for the present study. Participants were asked to rate their agreement with 16 statements.

Half of the statements concerned participants' perceptions of *most relationships*, such as, "In romantic relationships, most people can go to their partner when upset". The other half of the items asked participants to predict how their *next* partner would behave; a sample item was, "I predict that in my next romantic relationship my partner will not really be there for me when I'm in trouble" (reverse coded). The wording of the items were adapted from existing scales on trust and secure base support (e.g., Cassidy & Woodhouse, 2003; Rempel, Holmes, Zanna, 1985). In the present data, alpha was .83.

Results and Discussion

The mean scores for the description of the four secure base animations (reflecting the degree to which the descriptions followed the secure base script) ranged from 1.13 to 7.0 ($M = 4.01$, $SD = 1.3$). The mean scores for the description of the three control animations ranged from 1.25 to 6.92 ($M = 3.96$, $SD = 1.4$). As hypothesized, scores on the KNOWI-accuracy index were significantly associated with scores on the secure base animations task; $r = .29$, $p < .01$. However, KNOWI-accuracy scores were not significantly associated with scores on the control animations; $r = -.05$, $p > .05$. The correlation between KNOWI-accuracy and scores on the secure base animations did not change when scores on the control animations were partialled out, $r = .30$, $p < .01$. Thus, the two kinds of knowledge are significantly associated. These findings replicate the results of Study 10, and suggest that participants' general ability to infer human content from the animations is not responsible for the association between their ability to recognize the secure base script and their knowledge of the indicators of supportiveness.

The raters who rated the descriptions of the secure base animations judged the degree to which each description approximated the secure base script. However,

some participants had a tendency to use longer descriptions of all of the animations. (Item alpha for the number of words used for the eight animation descriptions was .91.) In order to examine whether longer descriptions lead to higher ratings on the secure base animation descriptions, the correlation between the average number of words that the participants used and the average rating of their secure base animation descriptions was computed. That correlation was $r = .03$, ns. Therefore, the length of the descriptions of the secure base animations did not seem to account for the ratings. Also, the association between the KNOWI-accuracy scores and ratings of the descriptions of the secure base animations did not change when the number of words in the descriptions was partialled out ($r = .37$, $p < .01$).

As in Study 10, Pearson correlations were computed, separately for each of the four animations, between (a) scores on how well participants recognized the secure base script and (b) scores on the organization of the descriptions. These correlations were .47, .32, .40, and .50 for the four secure base animations (all $ps < .001$). Similarly, correlations between secure base script-knowledge and causal connection scores were .50, .31, .41, and .48 for the four secure base animations (all $ps < .001$). Thus, as in Study 10, participants who could recognize the secure base script in the secure base animations provided descriptions of those animations that were better organized.

Scores assessing the degree to which descriptions followed the secure base script were also correlated with the number of action units that the participants had used to describe each animation. These correlations were .20, .21, .31, and .22 for the four secure base animations (all $ps < .05$). Similarly, correlations between the secure base scores and the number of distortions were $-.16$ ($p < .08$), $-.35$ ($p < .001$), $-.29$ ($p < .01$), and $-.26$ ($p < .01$) for the four secure base animations.

Taken together, these results (like those of Study 10) suggest that the stimuli presented in the animations can be conceptualized as a script. Recognizing the underlying script structure seems to help a person to organize an otherwise ambiguous collection of stimuli in the animations into a meaningful story. This organization, in turn, affects how a person perceives, interprets, and remembers those stimuli.

Associations with Attachment Avoidance and Attachment Anxiety

Next, I examined the association between the avoidance and anxiety scales of the Experiences in Close Relationships (ECR) with each of the two cognitive measures—knowledge of indicators and script-knowledge (availability of the secure base script). Items of the ECR differ greatly in their content: Only some items concern the giving or receiving of support at times of need (being there). An example of an item of the avoidance scale that does concern seeking support is: “I turn to my partner for many things, including comfort and reassurance”. On the other hand, many items of the avoidance scale do not concern support. For example, the item “I find it relatively easy to get close to my partner” does not refer to support exchanges.

The cognitions that are discussed in this article are primarily related to support-related closeness to others. Shaver, Belsky, and Brennan (2000) have shown the importance of a partner’s support (being there) at times of need as a primary component of attachment relationships. These researchers found that self-report items that reflect relying on a partner’s support at times of need are most highly correlated with an interview measure of attachment security (the Adult Attachment Interview, Main, Kaplan, & Cassidy, 1985). Similarly, Collins and Read (1990) showed that seeking the support of others at times of need is an important (and distinct) component of attachment security (especially non-avoidance).

Therefore, a graduate research assistant and I sorted the ECR items into two categories: those that do concern support and those that do not. The former group contained four avoidance items and one anxiety item. As shown in Table 3, the subset of support-relevant avoidance items did show a significant correlation with both indicator-knowledge and secure base script-knowledge. That is, people who had a tendency to avoid others' support had less knowledge of both types: They were less able to discriminate good from poor indicators of a supportive partner and they were less apt to recognize the secure base script in the animations.

Table 3

Associations between the Attachment Scales and the two Measures of Knowledge

ECR Scale	KNOWI-	
	Accuracy Scores ^{a,b}	Secure Base Animation Scores ^c
Avoidance Items Concerning Being There	-.32*	-.29*
Avoidance Items Not Concerning Being There	-.00	.03
Anxiety Item Concerning Being There	.24 [†]	.25 [†]
Anxiety Items Not Concerning Being There	-.02	.11

^a N = 63

^b KNOWI- Accuracy scores, controlling for KNOWI-Readiness

^c N = 51

* $p < .05$. ** $p < .01$. [†] $p < .10$.

The remaining avoidance items, which are unrelated to support, were not correlated significantly with either type of knowledge. The one anxiety item that does concern supportiveness had a positive correlation (that approached significance) with both measures of knowledge. Thus, anxious people were slightly more knowledgeable in both respects.

It should be noted, however, that the significant correlations between attachment avoidance (support-related items) and my new cognitive measures are modest. In addition, anxiety (a form of insecurity) showed a (marginally significant) *positive*, not negative, correlation with the two measures of knowledge. Thus, it seems that attachment security is not equivalent to having access to knowledge structures concerning support.

It is possible that attachment security depends on a number of other factors in addition to knowledge. Two possible factors are (a) desire (motivation) for support (assessed by KNOWI-readiness), and (b) generalized expectations for support. Therefore, the association of the attachment dimensions with these factors was examined. As shown in Table 4, the strength of participants' motivation for support was negatively correlated with the avoidance items concerning support: Not surprisingly, people who desire and value support from others are less likely to say that they avoid supportive contact. In contrast, avoidance of closeness in general (set of ECR items not concerning support) was not significantly associated with motivation for support. Thus, the predictive power of the motivation for support seems to be specific to avoidance of *support*. Furthermore, motivation for support was also related to anxiety about support (but not to general relationship anxiety); people showing support-related anxiety desire support more strongly.

Table 4 also shows that having general expectations that others are supportive is negatively correlated with both components of attachment avoidance (i.e., avoidance of support in particular as well as avoidance of closeness in general). This relationship is suggested by the theoretical model by Murray, Holmes, and Collins (2006), who propose that negative expectations make a person less likely to approach others. On the other hand, anxiety, whether general or specific to support, was not significantly associated with expectations of support.

Table 4

Associations between the Attachment Scales and (a) Generalized Expectations of Support and (b) Motivation for Support

ECR Scale	Motivation for Support ^{a,b}	Expectations for Support ^c
Avoidance Items Concerning Being There	-.38**	-.47**
Avoidance Items Not Concerning Being There	-.05	-.30*
Anxiety Item Concerning Being There	.27*	.09
Anxiety Items Not Concerning Being There	.05	-.19

^a KNOWI-Readiness scores, controlling for KNOWI-accuracy

^b N = 60

^c N = 65

* $p < .05$. ** $p < .01$.

Thus, support avoidance seems to be predictable from a person's degree of motivation for support and from the person's expectations about other people's supportiveness. To a lesser extent, support anxiety seems to be predictable from a person's degree of motivation for support. As my next step, I wanted to compare these two predictors (motivation for support and expectations concerning support) with the two knowledge structures; indicator-knowledge and script knowledge. For this purpose, all four predictors were entered into a regression equation predicting attachment avoidance (and then, attachment anxiety).

Table 5 shows the results of the regression equation predicting avoidance. Three factors had significant *unique* contributions: script knowledge, expecting others to be supportive, and motivation for supportive partners (marginally significant). (Indicator-knowledge, though significantly related to avoidance in bivariate analyses, was not a significant predictor in this multivariate model.) The multiple R was .61. These results suggest that avoidance of support can be broken down into a number of theoretically meaningful parts.

Table 5

Regression Equation Predicting Avoidance of Support (the Set of ECR Avoidance Items Concerning Being There). R = .61.

	<i>B</i>	<i>t</i>	<i>p</i>
Expecting others to be supportive	-.81	3.15	.003
Knowledge of the secure base script	-.19	-2.04	.047
Motivation for supportive partners	-.13	-1.97	.055
Knowledge of indicators of supportiveness	.06	.06	.675

Table 6 shows the results of the regression equation predicting attachment anxiety related to support. Three factors had significant unique contributions: indicator-knowledge, script-knowledge, and motivation for supportive partners. The multiple R was .45. Expecting others to be supportive, interestingly, was not independently predictive of anxiety. Thus, people with attachment anxiety seem to be people who (a) desire supportive contact and (b) perhaps in self-defense, have learned the indicators of a potentially supportive (or nonsupportive) partner. These findings will be discussed further in the General Discussion that follows.

Table 6

Regression Equation Predicting Anxiety Related to Support (the one ECR Anxiety Item Concerning Being There). $R = .45$.

	<i>B</i>	<i>t</i>	<i>p</i>
Expecting others to be supportive	-.47	-1.18	.246
Knowledge of the secure base script	.26	1.81	.077
Motivation for supportive partners	.25	2.45	.018
Knowledge of indicators of supportiveness	.52	2.33	.024

Chapter 13

General Discussion

Knowledge about Attachment Interactions

In discussing the development of personality, Bowlby (1979) has noted the importance of the "...ability or inability of an individual ...to recognize when a person is both trustworthy and willing to provide a base." (p. 104). Likewise, Shachner, Shaver, and Mikulincer (2005) have highlighted the same ability in adulthood—namely, the person's ability to read cues in "a relationship partner's reactions and intentions" (p. 150), cues that lead to an "appraisal that an attachment figure is available and responsive" (p. 152). In line with these ideas, I have assumed that knowledge (the foundation of this ability) constitutes an important ingredient of social judgments and social behavior. Therefore, we need to consider knowledge from a theoretical perspective.

A person's knowledge about attachment relationships must evolve from that person's history of experiences with other people. I assume that those experiences have led to a set of expectancies about interpersonal interactions (Holmes, 2000). Expectancies can often be expressed as "if. . . then" conditionals—e.g., "If I am sad, P notices." Such expectancies may be regarded as mini-scripts. When a set of expectancies (mini-scripts) is confirmed, the partner is judged to be responsive and therefore likely to be there when needed. This view resembles that of Bargh (1996), who commented that a script consists of a number of "if. . . then" cognitive sequences. Following Schank and Abelson (1995), I believe that knowledge of this type arises from the person's own direct experience as well as from the person's perceptions of (and hearsay about) other people's experiences and beliefs. In brief, the knowledge about indicators that a partner will be there when needed is viewed as

a composite of mini-scripts that are collected into a broader knowledge structure. This knowledge structure then enables a person to form expectations that do or do not lead to a sense of trust. As Holmes and Rempel (1989) have noted, "Expectations that form the . . . core of trust are those that focus on the partner's responsiveness to needs . . ." (p. 188).

Satisfying the Fundamental Attachment Motive

I have assumed throughout this dissertation that motivational constructs are organized hierarchically. At the most abstract level, interpersonal motives may be classified as *communal* or *agentic*. Each of these categories subsumes narrower categories, which in turn subsume still narrower categories. Very concrete categories are called goals, which generally imply relatively specific means of fulfilling the higher-order motive.

The fundamental attachment motive is a fairly abstract *communal* motive. It subsumes narrower motivational constructs (e.g., a motive to form a relationship with supportive attachment figures), and that motive subsumes narrower goals (e.g., a goal to identify potentially supportive partners). How does a person go about attaining this goal? According to the theory presented in this report, the person who wants to identify such a partner must possess some knowledge of the indicators, and the person must also be motivated to have attachment figures.

Knowledge of Indicators of a Potentially Supportive Partner

To assess the person's knowledge of indicators, I used prototype methodology to expose commonly used indicators. The KNOWI Task contains highly prototypic indicators mixed with less prototypic indicators. The accuracy measure describes how well a person can discriminate between the two types of indicators. A person who discriminates well is said to possess the requisite knowledge for

satisfying the goal that permits an ultimate satisfaction of the attachment motive.

The ELMO Effect and Motivation

My theory also contains a proposition that “an elevated motive leads to elevated ratings” (the ELMO effect). According to this proposition, features of any prototype of a motive (e.g., indicators) are more familiar to people with a strong motive because those people have acquired a greater backlog of experiences in which they have attempted to satisfy the motive. Therefore, highly motivated people generally rate many indicators (good and poor) as more informative because, owing to their past experiences, those people have acquired a greater sense of familiarity with many of the indicators. Thus, the sum of a person’s ratings on the KNOWI Task reflects the strength of that person’s motive for supportive attachment figures.

The studies reported support the ELMO effect by confirming its implications. Study 5 demonstrated that the sum of a participant’s ratings is correlated with Locke’s (2000) measure of communal motivation. Study 6 demonstrated that the content of a traditional test could be framed either as a *motive* (“It is important to me that my partner does X”) or as a *descriptor* of a person or relationship (“My partner does X”). The KNOWI-readiness measure was positively correlated only with the former. Study 7 replicated the ELMO effect in the context of a different motive (the intimacy motive). Study 8 demonstrated that the two indices of the KNOWI (one assessing knowledge, the other assessing motive strength) interact to provide a better predictor of relevant laboratory performance than either factor alone. The interaction effect was the same whether motive strength was assessed in the traditional way or by using the KNOWI-readiness. Study 9 extended the findings to everyday life: It confirmed the hypothesis that people with a high KNOWI-readiness score exhibit more attachment-related behavior in their everyday lives.

Other literature in cognitive psychology and social cognition is related to the ELMO effect. When a person rates the informativeness of an indicator, the person is, in effect, judging the *truth* of the proposition “this indicator is extremely informative”. Various researchers have asked people to rate the “truth value” of familiar and unfamiliar propositions and have shown that familiar propositions—both true and false—are generally rated higher in truth value (e.g., Begg, Anas, & Farinacci, 1992; Hasher, Goldstein, & Toppino, 1977; Reber & Schwarz, 1999; Unkelbach, 2007). It is not clear whether a familiar proposition has a higher “truth effect” (a) because it is more fluent (easier to process), (b) because it is more readily recognized from the past, or (c) because it has some other nonspecific “ring” of familiarity. All of these factors would seem to apply when a highly motivated person rates indicators of supportiveness.

In addition, Vorauer and Ross (1993) describe a “diagnosticity bias.” They showed that people, when trying to make a judgment that is relevant to some motive, “overestimate the extent to which behaviors and events convey the information that they most want to obtain” (p. 620). Vorauer and Ross suggest that a need to obtain information about a topic makes motive-relevant constructs more accessible to the person. Similarly, Greenberg, Pyszczynski, Warner and Bralow (1994) showed that, when people need to make a prediction, they “overestimate the relevance of available information to the judgment they are required to make” (p. 594; also see Lydon, Jamieson, & Holmes, 1997). In brief, other researchers have also observed that ratings of informativeness may be elevated by a strong motive related to the task.

Assessing Knowledge and Motivation with a Single Measure

The KNOWI Task has a distinct advantage over other types of measures used to study interpersonal relations: It does not require participants to describe their own

traits or motives. Participants simply rate the quality of each indicator as a predictor of a potential partner's future supportiveness. The measure thus circumvents confounding effects of social desirability associated with self-report.

Furthermore, the two indices obtained from the KNOWI (a difference-score in one case, a sum in the other) correspond well to the two fundamental indices of signal detection theory: One is an ability to discriminate (accuracy, sensitivity); the other is a readiness to deem a stimulus a signal (criterion bias). In brief, then, the KNOWI Task offers the advantages of signal detection methods: It allows a researcher to assess simultaneously two important individual-difference variables that are thought to play a role in support processes: knowledge and motivation.

The same method could be applied to assess many other interpersonal constructs. In writing about extremes of personality, for example, Millon and Davis (2000) have used the signal detection principle as a metaphor to characterize the behavior of people with a paranoid personality disorder. According to their analysis:

In warfare, survival often depends on the ability to detect an enemy, even if many false positives are generated as a result. In this sense, the life of the paranoid resembles submarine warfare... Survival depends on never allowing a false negative, that is, never missing the presence of a threat, even if a large number of false positives are generated thereby. (p. 394).

Brase (2003) suggested a similar idea concerning other personality disorders.

These ideas would be easily translated into a method of assessment. To use the example of an individual with a paranoid personality disorder, for example, one can imagine a measure that asks respondents to rate the degree to which each item indicates that another person cannot be trusted. When a person rates items of this prototype, the readiness index (the sum of all ratings) would assess each

respondent's overall degree of paranoid suspiciousness; that is, it would tell the strength of a person's self-protective motive to prevent humiliation and deceit from other people. The accuracy index (a difference between ratings of highly prototypic and less prototypic indicators) would reflect each respondent's ability to discriminate between good and poor indicators. In the same way, one could assess many other individual differences that are relevant to personality disorders (PDs)—e.g., cues that another person is apt to: abandon the person (Borderline PD), be disrespectful toward the person (Narcissistic PD), dismiss or ignore the person (Histrionic PD), or reject the person (Avoidant PD). This approach may also be applied when assessing processes related to normal personality functioning (cf., Higgins, 1997; Thompson, 1978).

As suggested by Lopes et al. (2004), knowledge and motivation may also interact with personality characteristics to affect everyday performance. For example, some knowledgeable and motivated people may lack self-efficacy (Bandura, 1997), producing a decrement in their ability to apply existing knowledge effectively. Likewise, neuroticism (e.g., chronic anxiety) may also interfere with performance. In that case, I might ask what a personality trait is. According to Allport (1937), a trait reflects a particular disposition, where *disposition* is defined as “*bona fide* mental structures. . . that account for the consistency of (the person's) behavior” (p. 289). But what are these mental structures? In my view, they include several components—motives and goals, abilities, and possibly other kinds of internal states—e.g., expectancies, schemas, scripts. I do not call a person “friendly” simply because I have observed a particular class of behaviors; I also need evidence of a communal motive and social know-how (Horowitz, 2004).

By separately assessing more than one component of a trait (as the KNOWI Scale does), we may be better able to describe the role of personality in interpersonal processes more precisely. For example, consider a trait, such as *sociability*. I believe that a score on a test of sociability may be analyzed theoretically into at least three components—one associated with ability, one associated with motivation, and one associated with everything else, including sources of error. In my view, two equally (and moderately) sociable people may differ with respect to each of the component parts: One person may be sociable because of very strong motivation combined with moderate social skill (ability); the other, because of very strong social skill (ability) combined with moderate motivation. By assessing both components, a single instrument based on signal detection methods allows us to examine their interactive effect. In brief, an advantage of the signal detection method used to construct the KNOWI is its power to disentangle one component from the other. It is hoped that in future research, this approach will be used to clarify the meaning and mechanisms involved in social interaction.

A Second Knowledge Structure: The Secure Base Script

As a second knowledge structure concerning attachment relationships, I examined the secure base script. Many participants in the present studies recognized the secure base script in animations involving geometric figures even though the geometric figures had few surface similarities to humans. This finding suggests that the abstract form of the script is readily available to many people. By using the secure base script, participants were able to organize the otherwise ambiguous movements in the animations into a meaningful sequence of events. This organization in turn affected the way participants processed information in the animations: Recognizing the script helped participants (a) see a common theme in

different animations, (b) include more elements in describing the animations, (c) report these details with fewer distortions, (d) create better organized stories when describing the animations, and (e) later recall more details of the animations.

Surprisingly, however, not everyone seems to have ready access to the secure base script. The availability and accessibility of the secure base script may have important effects in people's everyday lives. A person with ready access to the secure base script should be in a better position to recognize when support is appropriate—both as a seeker and as a provider. The person should also recognize when a partner provides quality support. This recognition, in turn, may allow the person to benefit more from support exchanges and may also help deepen the relationship. In addition, availability and accessibility of the script may enable a person to make more accurate global judgments about a partner's supportiveness. Thus, internal working models of attachment may play an important role in coming to trust a partner to be there when needed (Holmes, 2000; Rempel, Holmes, & Zanna, 1985).

The animation method used to assess availability and accessibility of the secure base script has advantages as an assessment tool. Because the stimuli are non-verbal and require only simple instructions, they can be used to test people of various ages and cultural backgrounds. The responses are relatively easy for participants to produce, and easy for a researcher to code. The accessibility of other scripts (even the "restaurant script") could also be tested using a similar method involving animations.

Two Types of Knowledge Structures

The present studies concerned two types of knowledge structures—indicator-knowledge (knowing the behaviors that indicate future supportiveness) and script-

knowledge (possessing ready access to the secure-base script). Indicator-knowledge concerns acts (behaviors) of a supportive person, whereas script-knowledge specifies the context (situation) in which those acts produce the desired outcome. For example, “supportive” acts that are delivered in an inappropriate context do not constitute genuine support—e.g., offering comfort or consolation to a very private person at a public gathering. Similarly, the wrong act in a context that calls for secure-base support might not be genuinely supportive—e.g., providing instrumental help when emotional support is wanted.

These two types of knowledge may be particularly important at different stages of a relationship’s development: Indicators (observed acts) may enable a person to make quick, but relatively accurate, predictions (even early in a relationship), whereas script knowledge may enable a person later to use a different type of yardstick to judge that partner, namely, whether the partner responds appropriately to specific situational demands (i.e., a desired person by situation interaction).

My findings indicate that these two types of knowledge are significantly correlated. I assume that the association between them arises as “internal working models of attachment” are formed: A person’s history of experiences relevant to secure-base support contributes simultaneously to both types of knowledge structures. There are probably a number of other knowledge structures contributing to internal working models of attachment, and the accessibility of those structures could be explored in future studies using similar methods.

Attachment Security and Internal Working Models

My results also indicate that people who avoid secure base support show less relevant indicator-knowledge and script-knowledge. By avoiding supportive

interactions, people may limit their opportunities to acquire the corresponding knowledge. Conversely, a deficit in knowledge may also cause people to minimize and avoid support in their lives. However, I do not believe that attachment security is “nothing but” having knowledge about support processes; knowledge seems to be necessary but not sufficient for a secure attachment. This idea is in line with Mikulincer’s (2007) view that:

... the concept of “working models” in attachment theory is akin to the concepts of schemas, prototypes, or scripts in the social cognition literature. Despite these commonalities, however, working models, as compared to the cognitive structures usually studied in social cognition research, involve a person’s wishes, fears, conflicts, and psychological defenses and are measurably affected by these psychodynamic processes. (p. iii).

Future research is needed to determine whether knowledge and attachment security— independently or jointly—explain different aspects of a person’s relationships, such as partner selection, effective support seeking, relationship satisfaction, and relationship dissolution. Future research can also examine whether aspects of an insecure attachment (fears, negative expectations, avoidance, anxiety and defense) interfere with the application of existing knowledge. Finally, future research might examine how and when this knowledge is attained and whether it can be acquired in adulthood.

Readiness to Seek the Support of a Specific Person

Several researchers have shown that a person’s attachment security may change from partner to partner (see Collins, Guichard, Ford, & Feeney, 2004, for a review). That is, a person may be comfortable seeking support from Partner A, but not from Partner B. Collins et al. argued that “felt security within a relationship should

therefore depend in large part on whether one's partner is perceived to be both willing and able to be responsive to one's own needs" (p. 212; also see Murray, Holmes, & Collins, 2006; and La Guardia, Ryan, Couchman, & Deci, 2000). Knowledge structures relevant to internal working models of attachment should be especially important in making judgments about *specific* partners and explaining *partner-specific* attitudes.

As noted previously, some researchers (Baldwin, Fehr, Keedian, Seidel, & Thomson, 1993; Collins et al., 2004) have suggested that knowledge structures concerning attachment relationships can be formulated as "if...then" rules; e.g., "If stressed, then seek support". According to Collins et al., one should also include the specific partner's qualities into this rule (e.g., If stressed—and *if this* partner is responsive—then seek that partner's support). The present studies further augment this formulation by stressing a property of *perceivers*: The perceiver must also possess relevant knowledge about partners and support processes in order to accurately evaluate a partner's responsiveness.

Knowledge and Motivation in Support Processes

How are the effects of knowledge and motivation related to the effects of other predictors of support processes? For example, suppose a person has chronic expectations that other people are generally unsupportive. Such expectations may affect the type of partner the person selects and the quality and quantity of support the person seeks (e.g., Collins, Cooper, Albino, & Allard, 2002; Collins & Feeney, 2000; Pietromonaco, & Carnelley, 1994; Simpson, Rholes, & Nelligan, 1992). In addition to having direct effects, such expectations may interfere with the application of whatever knowledge the person does possess. Similarly, a person may find it difficult to apply existing knowledge under particular circumstances—e.g., if the

person fears losing the partner; or is dazzled by the partner's physical attractiveness; or relies too heavily on over-learned relationship patterns from the past.

It is also possible that the factors cited above are particularly important when people make decisions about their own lives. Personally significant situations—i.e., situations involving “hot” cognitions—may require more than simply knowledge and strong motivation. In contrast, the situations used in Study 4 involved relatively “cold” cognitions. Future studies can examine the joint effects of all of these factors, including knowledge and motivation, on identifying supportive partners in hot- and cold-cognition situations.

Factors like those discussed above might also affect partner selection: For example, a person who makes correct judgments about the supportiveness of a potential partner in a neutral setting might not necessarily end up with a supportive romantic partner: Some other strong motive—such as a desire to be seen with a very attractive partner or a desire to avoid the possibility of having no partner at all—might overshadow the motive for a supportive partner. More research is needed to understand the complex mechanisms involved in partner selection. Future research could also examine how these and other factors shape other important outcomes, including the decision to end a relationship with an unsupportive partner.

How Do Knowledge And Motivation Develop?

McClelland and Pilon (1983), discussing intimacy, have suggested that a strong motive for intimacy may arise in two different ways: One pathway builds upon a history of warm, sensitive, and accepting interactions; the other builds upon a history of rejection, which sensitizes the person to the importance of intimacy. This dual pathway hypothesis may also apply to the development of a strong motive for supportive partners (the focus of the present study). In the same way, it is possible

that the *knowledge* of indicators of supportive partners can itself be traced to two separate relationship histories: If a person has often been disappointed by non-supportive others, that person may be sensitized to subtle cues of supportiveness. On the other hand, a person with a generally positive history of support may learn the very same cues through those positive experiences.

Two Traditions and a Theme in Common

Two different traditions within psychology have examined the importance of a sense of being supported by others. One, the *social support tradition*, has demonstrated the prevalence of support-seeking when people are distressed (Cutrona, 1986)—as well as the benefits of support for a person's health and psychological well-being (e.g., Cohen & Syme, 1985). The other, the *attachment tradition*, has examined the importance of people's needs for comfort and care (secure base support) by an attachment figure at times of stress and vulnerability. Attachment theory articulates common strategies (interaction sequences) that individuals use across the lifespan to obtain desired reactions from a caregiver—reactions that satisfy people's basic needs for comfort and care.

Although these two traditions differ in their historical roots and in their basic assumptions, they are similar in two important ways. Both emphasize the importance of social cognitions, including expectations about the partner. In this dissertation I have drawn upon the methods of *social cognition* as a way of bridging these literatures. I have operationalized two kinds of cognitive structures, thereby clarifying processes that are common to both traditions.

In addition, both traditions implicitly describe the essential role of trust in a supportive exchange. Attachment theorists (e.g., Sroufe & Waters, 1977) have emphasized the confidence a person feels that an attachment figure will be available

when needed (“felt security”). Social support theorists make a similar suggestion. According to Sarason, Shearin, Pierce, and Sarason (1987), “a supportive relationship involves the communication of acceptance and love. It is this feeling—that we are loved and valued, that our well-being is the concern of significant others—that is protective” (p. 830). Holmes (2002) has made this connection explicit by emphasizing the central role of interpersonal trust in an interpersonal relationship.

According to Holmes, expectations are even more basic than trust: In his view, the person’s *expectation* that a partner will be appropriately responsive when needed is the most fundamental aspect of a social relationship. I agree with Holmes’ analysis. Throughout this dissertation, I have referred to the basic role of expectations when a person seeks a supportive partner. Indeed, both types of knowledge structures expose important expectations that enable a person to take appropriate steps to satisfy the fundamental attachment motive. Indicator-knowledge allows a person to predict which potential partners can be *expected* to be helpful when support is wanted. And script-knowledge assures the person that those partners can be *expected* to follow a standard sequence to provide that support.

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Appendix
The KNOWI Scale

Can I count on you?

One of the key issues in developing a romantic relationship is whether you believe that your partner will always be there for you emotionally at difficult times. Of course, you never know for sure until the chips are down. But most people are pretty good at predicting whether they have found someone they can always count on. We are interested in how people become confident that a romantic partner will always be there for them. Below, you will find some of the indicators people say they use to make such judgments. Imagine yourself developing a relationship with *someone new*.

Please rate each indicator to tell to what extent it would increase your confidence that a potential partner will be there for you.

*WOULD NOT really increase
my confidence that a potential
partner will be there for me*

*WOULD VERY MUCH
increase my confidence
that a potential partner
will be there for me*

1 2 3 4 5 6 7 8

<i>Would it increase your confidence if a potential partner:</i>	<i>Rating^a</i>
1. tells me things that he/she doesn't tell to many people (F ^b)	6.36
2. loves me very much (F)	7.07
3. has interests in common with me (D _n)	4.32
4. is not inconsistent in the things he/sh`e tells me about himself/herself (F)	5.45

5. has not betrayed me before (F)	6.18
6. says things that portray him/her as tough, but is actually a sweetheart inside (F)	3.71
7. stops by or calls when I am sick (D _p)	6.56
8. remembers an upcoming stressful event I mentioned and asks me about it afterwards (D _p)	6.56
9. makes an effort to stay in touch with his/her own family (F)	5.66
10. gives me space when I need it, but remains ready to reconnect (D _p)	6.00
11. sacrifices his/her own plans to provide support (D _p)	6.85
12. is outgoing (D _n)	3.32
13. sees our relationship as destiny (F)	4.06
14. doesn't get on my nerves (D _n)	3.87
15. shows understanding about life (F)	5.12
16. respects the person I am and am trying to be (F)	6.37
17. listens to what I say and responds with interest and attention (F)	6.49
18. knows how I feel about something even if I haven't explained it explicitly (D _p)	6.07
19. offers to help me with something without me asking (D _p)	6.26
20. notices changes in my mood and asks if anything is wrong (D _p)	6.31
21. laughs at my jokes even though they are not funny (F)	3.68
22. is polite (D _n)	3.62
23. is honest and truthful with me (F)	6.59
24. tells me that I am the one for him/her (F)	4.62
25. listens fully to what I am saying even when he/she thinks that I am wrong (D _p)	5.89
26. has kept his/her word in prior situations (F)	6.71
27. sticks up for me if someone gives me a hard time (D _p)	6.55
28. does not pass judgment on my concerns (F)	5.56
29. knows something is wrong even though I haven't said anything (D _p)	6.08
30. doesn't mind being intimate with me in public (D _n)	4.58

31. freely discloses information about self (D _n)	5.27
32. has a nice personality (D _n)	4.29
33. is organized and goal-oriented (D _n)	3.64
34. sees how much I care (F)	5.12
35. does not ignore others on the street (D _n)	4.25
36. makes small compromises to accommodate my likes and dislikes (F)	5.63
37. asks me if I'm OK when getting the feeling that I'm not (D _p)	6.11
38. enjoys just being with me even if we don't do something special (F)	6.63
39. is friendly to everyone (D _n)	4.32
40. doesn't do things that are irritating to me (D _n)	3.91
41. listens to me and tries to understand my point of view (F)	6.26

^a Mean prototypicality rating.

^bF: Filler item, D_p: Discriminating-positive item, D_n: Discriminating-negative item.