EMOTIONAL AND SOCIAL INTELLIGENCE: EXAMINING ITS PLACE IN THE NOMOLOGICAL NETWORK

by

KIMBERLY ANNE BARCHARD

B.A., Simon Fraser University, 1993
M.A., The University of British Columbia, 1995

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Department of Psychology

The University of British Columbia
Vancouver, Canada

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ABSTRACT

Someone who attends to, understands, manages, and expresses emotions could be described as Emotionally and Socially Intelligent. Researchers and the general public have recently become interested in Emotional and Social Intelligence (ESI) because it may represent a new type of intelligence. The purpose of this dissertation was to determine which aspects of ESI represent new types of intelligence and how best to measure them.

Thirty-one ESI measures were administered to University of British Columbia undergraduate students, and correlated with measures of intelligence, the Big Five dimensions of personality, and Socially Desirable Responding. Seven ESI measures were administered to community members in the Eugene-Springfield area of Oregon who had previously completed measures of the Big Five dimensions.

Factor analyses and correlational analyses indicated that many self-report measures of ESI tap personality dimensions, not cognitive abilities. Being concerned about those who are less fortunate than oneself was strongly related to Agreeableness. Measures of paying attention to one's emotions and basing decisions upon them, expressing one's emotions, and responding empathically to other people's emotions formed a single factor. This Sensitivity factor does not appear to be a type of intelligence.

On the other hand, the ability to perceive emotions in others, in inanimate objects, and in other sensations does appear to be a new cognitive ability. Measures of this construct consistently formed a single factor, and this factor had a salient factor pattern coefficient on a higher-order factor identified as Crystallized Intelligence.

Measures of Emotional Insight also appear to tap cognitive abilities. These measures formed a first-order factor related to Crystallized Intelligence. However, these measures were associated with Verbal Ability, and additional research is needed to determine whether they are simply new measures of Verbal Ability.

Although most ESI measures are self-report, self-report questionnaires are inferior to maximum-performance tests when measuring cognitive aspects of ESI. They tended to form method factors, correlate with personality dimensions but not intelligence tests, and correlate with Socially Desirable Responding. Maximum-performance tests, in contrast, did not form method factors, correlated with cognitive abilities but not personality dimensions, and were uncorrelated with Socially Desirable Responding.

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OVERVIEW

The term "Emotional Intelligence" has generated a great deal of excitement since it was first introduced in 1990. The originators of the term Emotional Intelligence, Salovey and Mayer (1990), defined it as "the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and action" (p. 189). The concept of Emotional Intelligence is currently being used for such varied purposes as designing programs for school children (Goleman, 1995), evaluating job performance (Goleman, 1998), and individual counseling (Bar-On, 1997b). Measures of Emotional Intelligence are being used in corporations, educational institutions, medical settings, counseling and treatment programs, and numerous research studies (see, e.g., Bar-On, 1997b).

Emotional Intelligence is a new term, but it is related to several conceptually older terms. These include Social Intelligence, Empathy, and Alexithymia (a clinical condition related to a lack of words for feelings). In this dissertation, the combined area of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia will be referred to as Emotional and Social Intelligence.

Much of the excitement regarding Emotional and Social Intelligence surrounds the claim that it is a type of intelligence, much like Verbal Ability or Spatial Ability, that has previously been over-looked. If so, this would have implications for our theories of Intelligence, could have educational implications for school children, and could result in new methods of employee selection in some job types. Initial work by Mayer, Caruso, and Salovey (2000) suggests that some aspects of Emotional Intelligence may indeed be performing like new types of intelligence. In contrast, some aspects of Emotional Intelligence appear to be personality dimensions. The primary purpose of this dissertation was to determine which aspects of Emotional and Social Intelligence can legitimately be called types of intelligence and which aspects should be considered personality dimensions.

Many researchers have argued that types of intelligence can be divided into two broad categories (see e.g., Cattell, 1987; Carroll, 1993). Fluid Intelligence is one's problem-solving ability, and includes one's ability to reason with numbers, words, and figures. Crystallized Intelligence is one's accumulated knowledge, and includes knowledge of words, science, and geography, for example. Fluid and Crystallized Intelligence are two types of cognitive abilities, where a cognitive ability is defined as the potential for performance on a defined class of cognitive tasks. Other cognitive abilities include Memory and Visual Perception. If Emotional and Social Intelligence is actually a type of intelligence, it should be related to other types of intelligence, including Fluid and Crystallized Intelligence. Therefore, this dissertation also examined the relation of Emotional and Social Intelligence to Fluid and Crystallized Intelligence.

In the area of personality, many researchers argue for the presence of five higher-order domains, called the Big Five (see e.g., Costa & McCrae, 1992; Goldberg, 1999a). These dimensions are Extraversion, Neuroticism, Openness, Agreeableness, and Conscientiousness. Because some aspects of Emotional and Social Intelligence may be personality variables, this dissertation also examined the relation of Emotional and Social Intelligence to the Big Five.

Finally, many Emotional Intelligence measures are self-report. With any self-report measure, it is possible that respondents are not responding honestly: they may try to choose their answers in such a way as to make a good impression (Paulhus, 1991). This tendency

challenges the validity of self-report measures, especially if they are used in situations with high demand characteristics, such as selection testing for schools or work places. In addition, some measures of Emotional and Social Intelligence use other response formats that could be susceptible to this type of response bias. Therefore, the relation of many different types of Emotional and Social Intelligence measures to this response bias was examined.

Before examining the relation of Emotional and Social Intelligence to other variables, however, it is logical to ask what the internal structure of Emotional and Social Intelligence is. Does it represent a single coherent construct, or are there multiple subcomponents? If there are multiple subcomponents, are they correlated or independent? The internal structure of Emotional and Social Intelligence was the first question addressed by this dissertation.

In the next chapter, I provide more background information on Emotional and Social Intelligence. Next, I define and discuss the 14 subcomponents of Emotional and Social Intelligence that I will focus on during this research.

In the following five chapters, I discuss my research on each of the five questions above. I begin each chapter by presenting a literature review of previous research. Then I present my methods, results, and conclusions. I used two separate samples in this research: the first consisted of approximately 300 UBC undergraduate students; while the second consisted of approximately 800 community members in the Eugene-Springfield area of Oregon. The UBC Student Sample was used to answer most of the research questions, while the community sample was used to answer the question regarding the relation of Emotional and Social Intelligence to the Big Five dimensions. These samples and the measures they were given are described once, in the first section that uses them.

The final chapter summarizes and discusses these findings and discusses directions for future research.

CHAPTER 1: INTRODUCTION

What is Emotional and Social Intelligence?

The term "Emotional Intelligence" was first coined by Salovey et al. in 1990. Despite the short time since the term was introduced, several different approaches to Emotional Intelligence have been developed. Furthermore, while the term "Emotional Intelligence" is new, many aspects of the construct are not. Emotional Intelligence is conceptually related to several older and better-known psychological constructs, primarily Social Intelligence, Empathy, and Alexithymia. I will discuss each of these areas in turn.

Emotional Intelligence

As already mentioned, Salovey et al. (1990) defined Emotional Intelligence as "the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and action" (p. 189). More recently, Mayer et al. (2000) have taken a cognitive ability approach, focusing on four domains: perceiving emotions in oneself and others, assimilating emotions, understanding emotions, and managing emotions in oneself and others. Goleman's (1995) popular book outlined five domains of Emotional Intelligence: knowing one's emotions, managing one's emotions, motivating oneself, recognizing emotion in others, and handling relationships (which includes managing emotions in others). Finally, Bar-On (1997a) defined emotional, personal, and social intelligence (collectively referred to as EQ) as "the ability to understand oneself and others, relate to people, and adapt to and cope with the immediate surroundings" (p. 3), and claims that "EQ provides an indication of one's noncognitive ability to succeed in coping with environmental demands" (p. 2). Although these definitions overlap, some aspects of Emotional Intelligence are unique to only a single model or definition.

Social Intelligence

In 1920, E.L. Thorndike defined Social Intelligence as "the ability to understand and manage men and women, boys and girls—to act wisely in human relations" (p. 228). Since that time, both aspects of Social Intelligence—the ability to understand others and the ability to act wisely in social situations—have been studied (Walker & Foley, 1973). Relatively recent research has shown that it is important to distinguish between socially intelligent thought and socially intelligent behaviour, and to distinguish both of these from sociability (see, e.g., Marlowe, 1986; Walker & Foley, 1973; Zuckerman & Larrance, 1979).

Social Intelligence is clearly related to Emotional Intelligence: the conceptual definitions overlap. In addition, measures of Social Intelligence and Emotional Intelligence often have similar items. For example, the items on the Chapin Social Insight Test (Chapin, 1942) and the items on the Stories subtest of the Multifactor Emotional Intelligence Scale (MEIS; Mayer et al., 2000) are quite similar; likewise, the items on the Expression Grouping test of Social Intelligence (O'Sullivan & Guilford, 1976) and the Faces subtest of the MEIS both assess understanding of non-verbal expressions of emotion. Finally, instruments that were originally designed to measure Social Intelligence are commonly used to measure Emotional Intelligence (see, e.g., Wong, Day, Maxwell, & Meara, 1995). Thus, Social Intelligence and Emotional Intelligence are clearly related. However, researchers disagree on the exact relation between Emotional Intelligence and Social Intelligence: some researchers claim that Social Intelligence is an older concept, a precursor to Emotional Intelligence (e.g., Salovey & Mayer, 1990), while others include Social Skills as a subcomponent of Emotional Intelligence (e.g., Measurement and Planned Development, 1998).

Empathy

The second construct that is related to Emotional Intelligence is Empathy. Empathy has historically been defined in a two different ways (Mehrabian, Young, & Sato, 1988). First, it can be defined as the ability to understand another person's feelings and perspective and to accurately predict their thoughts, feelings, and actions (a cognitive perspective-taking approach). Dymond (1949), for example, used this approach. This form of Empathy can be seen as one component of Emotional Intelligence, because definitions of Emotional Intelligence often involve understanding other people.

Second, Empathy can be defined as a vicarious emotional response to the perceived emotional experiences of others. Mehrabian (1996; Mehrabian et al., 1988), for example, used this approach. The relation of this type of Empathy to Emotional Intelligence is less clear, as definitions of Emotional Intelligence do not usually include sensitivity to others' emotions. However, some measures of Emotional Intelligence do include subscales for this construct (see, e.g., TEIS, Tett, Wang, Gribler, & Martinez, 1997). Therefore, this aspect of Empathy can also be seen as a component of Emotional Intelligence.

Alexithymia

The third construct that is related to Emotional Intelligence is Alexithymia. The term "Alexithymia" literally means "without words for feelings." Alexithymia is a clinical condition primarily associated with difficulty understanding and describing feelings. In addition, Alexithymia is associated with (a) difficulty distinguishing between feelings and bodily sensations, (b) lack of introspection, (c) social conformity, (d) impoverished fantasy life and poor dream recall (Taylor, Ryan, & Bagby, 1985), and (e) operatory thinking (a tendency to focus on external events rather than emotions) (Linden, Wen, & Paulhus, 1995).

Several of the symptoms of Alexithymia overlap with the concept of Emotional Intelligence. The primary disorder in Alexithymia, not having words for feelings, is the direct opposite of the ability to recognize, understand and describe one's feelings, a key component of all models of Emotional Intelligence. As well, the tendency to focus on external events rather than emotions is the opposite of the tendency to focus on and base decisions upon feelings, a dimension that is included in one measure of Emotional Intelligence (the TEIS; Tett, Wang, Gribler, & Martinez, 1997). Definitions of Emotional Intelligence do not currently include many of the other symptoms that accompany Alexithymia, but such empirical relations could exist.

Emotional and Social Intelligence (ESI)

As I have mentioned, these four terms—Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia—refer to overlapping constructs. In some cases, two different researchers might use two different labels to refer to the exact same construct or the same test, making distinctions between these four constructs awkward. For example, the TAS-20 is used both as a measure of Alexithymia (Bagby, Parker, & Taylor, 1994) and as a measure of Emotional Intelligence (Davies, Stankov, & Roberts, 1998). Similarly, O'Sullivan and Guilford's tests are used as measures of both Social Intelligence (O'Sullivan and Guilford, 1976) and Emotional Intelligence (Wong et al., 1995). In addition, reviews of Empathy include instruments originally designed as measures of Social Intelligence (Walker & Foley, 1973), and reviews of Social Intelligence include instruments originally designed as measures of Empathy (Chlopan, McCain, Carbonell, & Hagen, 1985).

Relatedly, different people who use these four terms mean different things by them. Different models and measures of Emotional Intelligence, for example, include very different constructs and subscales: only 2 of the 15 components included in Bar-On's (1997b) model of Emotional Intelligence overlap with the model of Emotional Intelligence posited by Mayer and Salovey (1997), and only 4 of Bar-On's components overlap with the 12 Emotional Intelligence dimensions posited by Tett, Wang, Gribler, and their associates (1997). Inconsistent usage of terms is not restricted to Emotional Intelligence: different writers use the terms Social Intelligence, Empathy, and Alexithymia in different ways as well.

From the above discussion it should be clear that there are some difficulties with using the terms Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia. The constructs covered by these four terms overlap, so that different terms may be used to refer to the same construct or scale. As well, different researchers and practitioners use these terms in radically different ways, so that there may be little overlap among the constructs or scales that two researchers claim fall under one of these labels. These points are acknowledged in the field, with researchers acknowledging the overlap among these constructs (see, e.g., Chlopan et al., 1985; Mayer, Salovey et al., in press; Walker & Foley, 1973) and conflicts among different definitions of the same terms (see, e.g., Goleman, 1995; Mayer, Salovey, & Caruso, in press; Salovey & Mayer, 1990).

Because of the problems associated with these labels, I will refer to the combined area of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia as the area of Emotional and Social Intelligence (ESI); I will make no further distinctions between these four concepts, unless it is to point out that an instrument or model was originally designed for a particular one of these four areas. Any instrument that claims to measure Emotional Intelligence, Social Intelligence, Empathy, or Alexithymia and any model of any of these four constructs will be considered to fall within the ESI area.

What is this ESI area? It is simply a collection of overlapping models and variables. In this, it is akin to the area of personality. Personality is a research area that encompasses a wide variety of variables. Various models and measures of personality exist, and overlap to some extent, but no single model or measure includes every aspect of personality. I propose that the ESI area is similar to the personality area, in that the various models and measures that fall within this domain can be expected to overlap only partially, and that new variables will continue to be added. This analogy is not meant to imply that the ESI area is outside of the personality area. One of the purposes of this research is to demonstrate that ESI overlaps with both personality and intelligence. See Figures 1 and 2.

Subcomponents of Emotional and Social Intelligence

Before I can review the research on ESI and describe my own research, I need to more fully define the ESI area. Because different authors use the terms Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia in different ways, the ESI area is very broad. I could not study every variable that any researcher had ever claimed falls into one of these four areas. I therefore needed to determine which aspects of ESI are the most important so that I could focus my studies upon them.

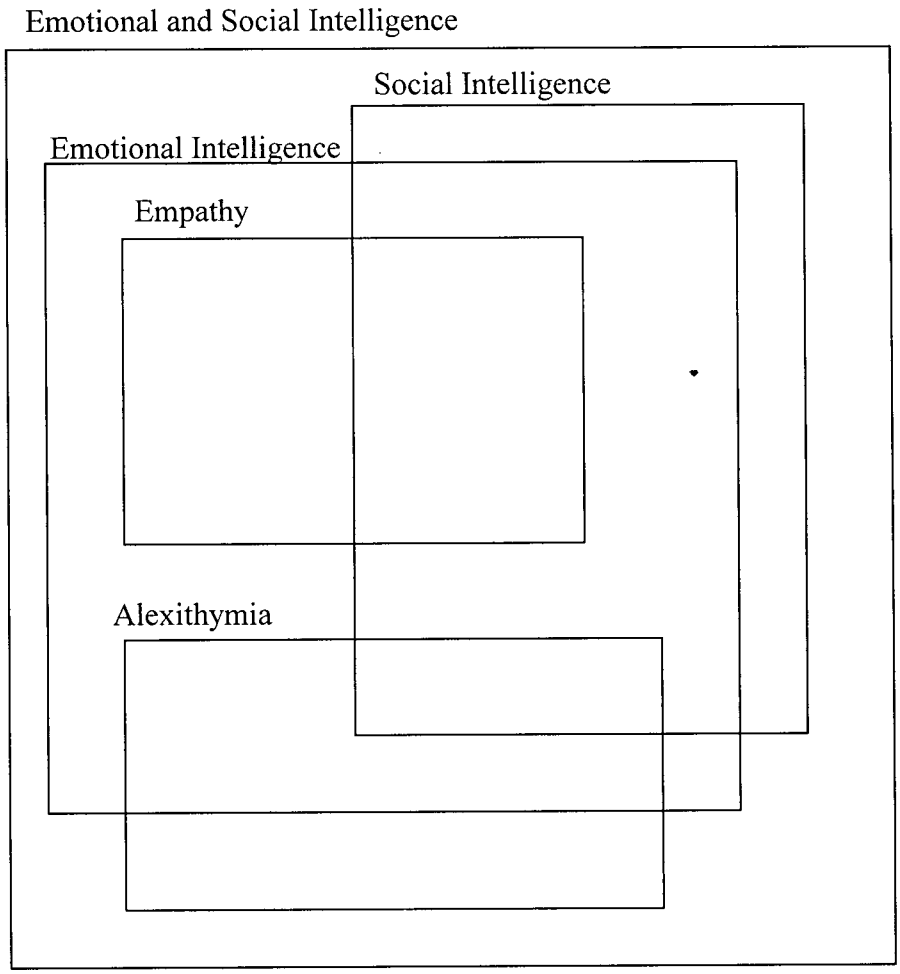

Figure 1
The Relation of Emotional and Social Intelligence (ESI) to
Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia

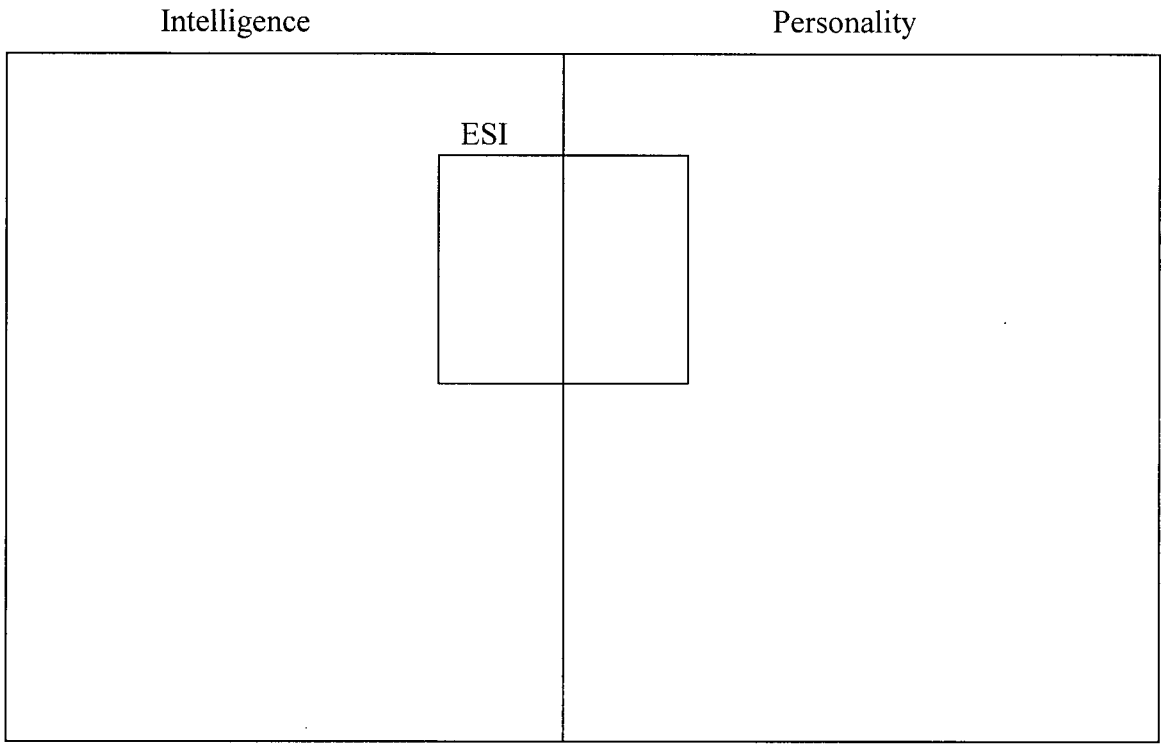

Figure 2
The Hypothesized Relation of Emotional and Social Intelligence to Intelligence and Personality

In the area of personality, some consensus has been reached regarding some of the more important variables, and how some of these variables are related to each other. For example, Extraversion is an important personality variable, and Gregariousness, Friendliness and Assertiveness are related to it (Goldberg, 1999b). This type of consensus has not been reached in the ESI area. There is as yet no agreement regarding the important variables or how they are related to each other.

Two approaches could be taken to identifying the important variables in the ESI area. First, if sufficient resources were available, every available measure of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia could be administered to a large sample of participants, and factor analyzed. Concepts that are empirically distinguishable and frequently appearing would form factors. These factors could be interpreted, and the concepts that underlie them could be taken as a set of important concepts in the ESI area.

Unfortunately, this approach is infeasible given the large number of measures of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia (see Appendix B for a description of many existing ESI measures). Therefore, a second approach was sought. First, I rationally identified the important concepts in the ESI area, based on my reading of previous research. Then, a factor analysis was done for those concepts for which several different measures are available. This factor analysis is reported in the next chapter.

To derive my preliminary list of important concepts in the ESI area, I took a two step approach. First, I identified themes that appeared repeatedly in ESI models and measures. For example, the TAS-20 Difficulty Identifying Feelings subscale (Taylor et al., 1985) and the Trait Meta-Mood Scale (TMMS) Clarity subscale (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995) both assess the degree to which the respondent is able to understand their own emotional states. Another measure, the Levels of Emotional Awareness Scale (Lane, Quinlan, Schwartz, Walker, & Zeitlan, 1990), assesses the degree of differentiation and integration of emotion-related constructs, and thus also appears to reflect the extent to which the respondent understands their emotions. The ability to understand emotions, therefore, is a common theme in the ESI area.

I read the ESI literature carefully, and developed a list of seven such common themes. To demonstrate empirically that these are frequently appearing and empirically distinguishable concepts, I could collect together two or three measures of each of these concepts, administer them to a sample, and conduct a factor analysis. However, it might be that there were further distinctions that could be made between some of the measures that I classified under the same general concept, but that these distinctions could not be made because too few measures of each were included in the statistical analysis. Therefore, the second step in the development of my preliminary list of important concepts in the ESI area was to make *logical* distinctions within each category. For example, one of my initial categories was "Managing Emotions." I noticed, however, that the scales that seem to measure this concept could be logically divided into those that focus on managing emotions in the self and those that focus on managing emotions in others. Logically, these concepts are distinguishable. Therefore, it might be that they are empirically distinguishable as well. Because of this, I distinguished between these two concepts, so that I could later be sure to include at least two or three measures of each. In that manner, if the concepts were empirically distinguishable, my data analysis would have a chance to show that.

This two-step process resulted in a list of 14 concepts. There are many concepts that have been discussed in the ESI literature that were not included in this list. Concepts were excluded if (a) the concept is unique to a single model or measure, (b) the concept is not particularly related to either emotions or intelligence or c) the concept represents a well-established research area in itself. Concepts that have been excluded include (but are not limited to) the following: knowledge of proper etiquette, knowledge of social roles, tendency to engage in perspective-taking, impoverished fantasy life, self-esteem, motivation, delay of gratification, conscientiousness, and happiness. Other ESI researchers doubtless consider some of these areas important: each of these areas is studied by at least some researchers in the ESI area. However, unless I was to study every concept that any researcher has ever suggested is related to Emotional Intelligence, Social Intelligence, Empathy, or Alexithymia, I needed to choose some limited number of concepts to study, and this I did. Thus, my final list included 14 concepts, which I call subcomponents of ESI.

Table 1 provides a listing of the 14 constructs that I identified in my examination of the literature. I will refer to these constructs as the 14 subcomponents of ESI, although the reader is reminded that this list is not exhaustive. Each of these subcomponents is discussed repeatedly in the literatures of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia, and in most cases more than one measure of these subcomponents exist. I have listed examples of measures of these subcomponents in the table.

Existing instruments often include items from more than one of these 14 subcomponents. For example, the Empathy subscale from the EQ-i (Bar-On, 1997b) includes items that appear related to (a) Recognizing Emotions in Others, (b) Empathic Concern, and (c) Responsive Distress; similarly the Emotional Self-Awareness subscale from the EQ-i includes items that appear related to (a) Emotional Expression, (b) Attending to Emotions, and (c) Emotional Understanding. In most cases where an instrument had content related to two or more of the 14 subcomponents, I did not consider it to be a good measure of any one of those subcomponents because of its possible factorial complexity, and therefore did not list it in the table. There was one exception to this: the Empathy scale from TEIS (Tett, Wang, Gribler, & Martinez, 1997) appears to be a fairly clear measure of Responsive Distress, with the exception of a single item related to Responsive Joy.

Table 1
Subcomponents of ESI and Example Measures

Subcomponents	Example Measures	
Emotional Understanding	Levels of Emotional Awareness Scale	
The ability to recognize one's own emotions, as they occur, and to understand emotions in general	MEIS*	Blends
		Progressions
		Transitions
		Relativity
	MSCEIT	Blends
		Progressions
		Transitions
		Analogies
	TAS-20	Difficulty Describing Feelings
		Difficulty Identifying Feelings
	TEIS	Emotional Appropriateness
	TMMS	Clarity
	EQ-I	Self-awareness
Emotional Integration	MEIS	Synesthesia
The ability to generate, use, and feel emotions as necessary to communicate feelings, or employ them in other mental processes		Feeling Biases
	MSCEIT	Synesthesia
		Facilitation
		Sensation Translation
Recognizing Emotions in Others	MEIS	Faces
The ability to recognize the non-verbal emotional expressions of others	MSCEIT	Faces
	OGSI	Expression Grouping
	TEIS	Recognition of Emotion in Others
	SSI	Emotional Sensitivity
	Perceived Decoding Ability	
Perception of Emotions in Objects	MEIS	Music
The ability to perceive emotions in inanimate objects		Designs
		Stories
	MSCEIT	Landscapes
		Designs
Social Insight	CSIT	
The ability to forecast the thoughts, feelings, and actions of others	OGSI	Cartoon Predictions
		Missing Cartoons
		Social Translation
Managing Emotions in the Self	MEIS	Managing Feelings of Self
The ability to modulate emotions in oneself as desired	MSCEIT	Emotion Management
	TMMS	Repair
	TEIS	Regulation of Emotion in Self
Managing Emotions in Others	MEIS	Managing Feelings of Others
The ability to modulate emotions in others as desired	MSCEIT	Emotions in Relationships
	TEIS	Regulation of Emotion in Others

Table 1 con't

Subcomponents	Example Measures	
Positive Expressivity The tendency to express one's positive emotions nonverbally	GJES	Positive Expressivity
Negative Expressivity The tendency to express one's negative emotions nonverbally	GJES	Negative Expressivity
Attending to Emotions The tendency to attend to emotions and be aware of them	TMMS SIPOAS	Attention Based on Body
Emotion-Based Decision-Making The tendency to make plans and decisions based on one's feelings rather than basing them on logic	TEIS	Flexible Planning
Responsive Distress The tendency to become distressed when in the presence of other people who are distressed	TEIS IRI QSE	Empathy Personal Distress Empathic Suffering Responsive Crying Feeling for Others
Responsive Joy The tendency to become happy or cheerful when in the presence of other people who are happy or cheerful	QSE	Positive Sharing
Empathic Concern The tendency to feel concern or sympathy for those who suffer	IRI	Empathic Concern

* These abbreviations are explained in Appendix A, and descriptions of these measures are given in Appendix B.

Rationale for the Fourteen Subcomponents of ESI

Emotional Understanding

As I mentioned above, the ability to understand emotions is a common theme in the ESI literature. Over a dozen scales and subscales appear to measure some aspect of understanding of emotions. For example, there is the Difficulty Identifying Feelings subscale of the TAS-20 (Taylor et al., 1985) and the Clarity subscale of the TMMS scale (Salovey et al., 1995), both of which seem to measure the extent to which a person understands their own emotional experiences. The Levels of Emotional Awareness Scale (Lane et al., 1990) measures depth and breadth of understanding of emotion-related constructs. The TEIS (Tett, Wang, Gribler, & Martinez, 1997) Emotional Appropriateness subscale measures knowledge of how one is likely to feel in a given situation. One scale from the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 1999), the Blends scale, appears to be vocabulary test of emotion-related words. Thus, the ability to understand emotions is commonly mentioned, and measures of this construct can be found among instruments that were originally designed to measure Emotional Intelligence, Empathy, and Alexithymia.

Research using the Multi-Factor Emotional Intelligence Scale (MEIS; Mayer et al., 2000) demonstrated that Emotional Understanding is distinct from both the ability to perceive emotions and the ability to manage emotions. In their factor analytic study, Mayer and his colleagues found that Emotional Understanding was marked by six subscales. These included four subscales that were designed to measure Emotional Understanding, as well as two subscales that were designed to measure a separate construct: Emotional Integration. Emotional Integration is the ability to assimilate emotions into perceptual and cognitive processes. The first of their two Emotional Integration subscales is called Synesthesia, and measures the ability to describe emotional sensations and their parallels to other sensory modalities. The other measure is called Feeling Biases, and asks people to assimilate their present mood into their judgments of how they feel toward a fictional person. These subscales are described in greater detail in Appendix B. It may be that these two subscales did not form a factor separate from the Emotional Understanding scales because the factor was not clearly enough marked (the more variables used to mark a factor, the more likely that the factor will emerge). In their current research, Mayer et al. (1999) have created a new scale, the MSCEIT, which includes a greater number of measures of Emotional Integration. Perhaps future research will show that Emotional Integration can now be distinguished from Emotional Understanding. Therefore, in my table of subcomponents of ESI, I have distinguished between (1) Emotional Understanding and (2) Emotional Integration, despite the fact that research has yet to show that these are empirically distinguishable.

Emotion Perception

Many researchers have distinguished between the ability to recognize emotions in oneself, Emotional Understanding, and the ability to recognize emotions outside of oneself, Emotion Perception (see, e.g., Mayer et al., 1999; Tett, Wang, Gribler, & Martinez, 1997). As well, Mayer et al. (2000) empirically demonstrated that the ability to perceive emotions is distinct from both Emotional Understanding and Emotion Management, as mentioned above.

Many different instruments appear to measure the ability to recognize the non-verbal emotional expressions of others. For example, the Faces scale of the MSCEIT asks respondents to rate different faces on the extent to which different emotions are present.

Similarly, the Expression Grouping test of O'Sullivan and Guilford (1976) asks participants to select the gesture, posture, or facial expression on the left that represents the same thought, feeling, or intention as a set of three pictures on the right. In addition, several self-report measures of this concept are available, including the Recognition of Emotion in Others subscale of the TEIS (Tett, Wang, Gribler, & Martinez, 1997), the Emotional Sensitivity subscale of the Social Skills Inventory (SSI; Riggio, 1989), and the Perceived Decoding Ability scale (Zuckerman & Larrance, 1979).

Mayer et al. (2000), in their research on the MEIS, found that a subtest designed to measure the ability to recognize non-verbal emotional expressions of others (the Faces scale) loaded on the same factor as subscales designed to assess the ability to recognize the emotions present in music and abstract designs (the Music and Design scales). It may be that the ability to recognize emotions in inanimate objects is empirically indistinguishable from the ability to recognize emotions in other people. However, these two constructs are logically distinguishable. It is conceivable that separate factors did not emerge for these two constructs in the Mayer et al. (2000) study, simply because there were not enough marker variables for the ability to recognize non-verbal emotional expressions of others: there was only the one subscale. In Table 1, I therefore distinguish between (3) Recognizing Emotions in Others and (4) Perception of Emotions in Objects. In this way, I was able to ensure that I included multiple measures of each construct, to determine whether these concepts are empirically distinguishable.

Social Insight

Many researchers have discussed the concept of Social Insight—the ability to understand what others will think, feel, and do. Several different measures appear to assess this concept. The Chapin Social Insight Test (CSIT; Gough, 1965, 1993) consists of a series of situations. In each, the respondent selects the response that most accurately reflects the thoughts or actions of the people involved. The O'Sullivan and Guilford Social Insight (OGSI; O'Sullivan & Guilford, 1976) tests include three measures of Social Insight. In the Missing Cartoons test, participants select the cartoon that shows that will happen next in a story. The Social Translations test assesses understanding of the meaning behind words that are spoken between two people. Finally, in the Missing Cartoons test respondents select the cartoon that fills in the missing space in a series of cartoons, to complete the story. In each of these measures, respondents must demonstrate knowledge of how others think, feel, and act. I have included Social Insight as the 5th ESI subcomponent.

Managing Emotions

Many researchers have discussed the ability to manage emotions in oneself and others. Mayer and Salovey included Emotion Management in both their model of the meta-experience of mood (which they consider to be one part of Emotional Intelligence; Salovey et al., 1995), and their model of Emotional Intelligence (Mayer & Salovey, 1997). Their interest in this construct has lead to five different subscales in three different tests: the TMMS repair subscale (Salovey et al., 1995); the MEIS Managing Feelings of Others and Managing Feelings of Self subscales (Mayer et al., 2000); and the MSCEIT Emotion Management and Emotions in Relationships subscales (Mayer et al., 1999). Tett (Tett, Wang, Gribler, & Martinez, 1997), who was building upon the Salovey et al. (1990) model, designed two subscales to measure managing emotions: Regulation of Emotions in the Self and Regulation of Emotions in Others.

As mentioned above, Mayer et al. (2000) demonstrated that Managing Emotions is empirically distinguishable from Emotional Understanding and from Emotion Perception. In their study, the two Managing Emotions subscales formed a separate factor from the other subscales in the MEIS.

Managing Emotions in Oneself and Managing Emotions in Others are logically distinguishable. It may be that the only reason that two separate factors did not emerge in the above study is that there were an insufficient number of measures for each of these concepts (there was only a single subscale for each). Robert Tett (personal communication, May 1999) conducted a factor analysis of his scale, and found that his two measures of managing emotions did not load on the same factor. Therefore, in my list of ESI subcomponents, I distinguished between (6) Managing Emotions in the Self and (7) Managing Emotions in Others.

Emotional Expressivity

The tendency to express one's emotions non-verbally is a common theme in the ESI literature. Emotional Expressivity is included in models and measures of both Emotional Intelligence and Social Intelligence. For example, the TEIS (Tett, Wang, Gribler, & Martinez, 1997) includes a measure of emotional expressivity (the Emotion in the Self—Nonverbal subscale) as does the SSI (the Emotional Expressivity subscale; Riggio, 1989). Logically, the tendency to express positive emotions (Positive Expressivity) can be distinguished from the tendency to express negative emotions (Negative Expressivity), although these researchers did not made this distinction. In the TEIS items, the valence of the emotions is never mentioned: the items refer to "feelings" or "emotions", but not to particular emotions such as anger or happiness. In the SSI, while some items are neutral, others do include particular emotions that are either positive or negative in valence. However, these items are summed into a single subscale, and no item-level factor analysis was conducted to determine whether Positive and Negative Expressivity are empirically distinguishable.

Gross and John (1999) examined a number of measures of Emotional Expressivity and Emotional Intensity, and found that items on these scales fell into five groups—Expressive Confidence, Positive Expressivity, Negative Expressivity, Impulse Intensity, and Masking—based on an item-level factor analysis. The items on the Expressive Confidence, Impulse Intensity, and Masking scales have little in common with the items on ESI measures, and I therefore considered these constructs to be outside the ESI area. However, many of the items on the Positive Expressivity and Negative Expressivity scales seem to measure the same constructs as the items on the TEIS and SSI subscales. It therefore seemed reasonable to include both (8) Positive Expressivity and (9) Negative Expressivity in my list of subcomponents of ESI.

I should mention at this point that, although I have listed the two subscales from Gross and John (1999) as examples of measures of Positive Expressivity and Negative Expressivity, I do not consider these to be very good measures of these constructs. Examination of the item content of these scales suggested that many of the items measure intensity of emotional experiences, similar to many of the items on the Impulse Intensity scale. For my own research, new scales were developed to measure these two constructs. In developing these scales, I tried to more clearly distinguish Positive and Negative Expressivity from the tendency to feel positive and negative emotions and from the intensity of those

emotions. Each scale has 10 items, 5 of which are reverse-scored. These two scales are given in Appendix B.

Emotional Attention

The tendency to attend to emotions and make decisions based upon them has been discussed by several researchers in the ESI area. Salovey et al. (1995) hypothesized that the tendency to pay attention to one's emotional state is a key component in the meta-awareness of mood, which they see as one part of Emotional Intelligence. Their measure, the TMMS, showed that this tendency could be distinguished from Emotional Understanding and from the ability to manage one's emotions. A second scale that measures Attending to Emotions was developed by Bernet (1996). He posited three different approaches to emotions: Based on Body, Emphasis on Evaluation, and Looking to Logic. In his model, Based on Body is the tendency to understand one's emotions as related to bodily sensations (as opposed to understanding one's emotions based on ideals or expectations, or logical reasoning). People who score high on the Based on Body scale attend to the bodily sensations associated with emotions, and are seen as "being in touch with their feelings." A third scale that is relevant to Attending to Emotions is the Externally-Oriented Thinking scale of the TAS-20 (Taylor et al., 1985). This scale measures the tendency of respondents to focus on objects and events, rather than their own emotional reactions. This scale can thus be seen as the opposite of focusing on one's emotions. Finally, the tendency to make plans and decisions based upon one's feelings is measured by the Flexible Planning subscale of the TEIS (Tett, Wang, Gribler, & Martinez, 1997). Thus, the tendency to attend to emotions and to make decisions based upon them is a common theme in the ESI literature.

Within this area, a logical distinction can be made between simply attending to one's emotions and using one's emotions to assist in decision-making. It is possible, for example, that for some people the tendency to focus on one's emotions leads to a lack of decision-making. This might be the case in very depressed people who ruminate upon their emotional state and fail to take action. In contrast, it may be that for most people, paying close attention to one's feelings is a prerequisite to using that information in decision-making. If that is the case, then these two concepts may be highly correlated. In my list of ESI subcomponents, I distinguished between (10) Attending to Emotions and (11) Emotion-Based Decision-Making. Only by distinguishing between them could I ensure that I measured both, and so was able to determine empirically the extent to which they are related.

Empathy

Finally, many scales in the ESI area include measures of various aspects of Empathy. These include scales designed to measure Empathy, as well as subscales in Emotional Intelligence measures. Most of the Empathy measures are multi-dimensional, but different models and measures include different subscales. Examining these, three recurrent themes can be logically distinguished. The first of these is Responsive Distress, the tendency to become upset when in the presence of other people who are upset. Most of the items on the Balanced Emotional Empathy Scale (BEES; Mehrabian, 1996) and the TEIS (Tett, Wang, Gribler, & Martinez, 1997) Empathy subscale appear to measure this concept. The Personal Distress subscale of the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983), and the Empathic Suffering, Responsive Crying, and Feeling for Others subscales of the Quick Scale of Empathy (QSE; Caruso & Mayer, 1999) also seem to measure Responsive Distress.

One measure explicitly distinguishes between Responsive Distress and its companion, Responsive Joy (the tendency to become happy when in the presence of other people who are happy): the QSE has a separate subscale for Responsive Joy, the Positive Sharing subscale. The inclusion of a separate subscale for this construct in the QSE was based on an item-level factor analysis that showed that these two constructs could be distinguished empirically (Caruso & Mayer, 1999). Other scales also include items related to Responsive Joy. For example, the BEES includes three items related to this concept, and the TEIS Empathy Scale has one such item. However, the creators of these scales did not distinguish between Responsive Distress and Responsive Joy on either rational or empirical grounds.

A third concept can be distinguished from both Responsive Joy and Responsive Distress. This is the area of Empathic Concern: the tendency to feel concern or sympathy for those who suffer. Many of the items on the BEES appear to measure Empathic Concern, as do some of the items on the EQ-i Empathy subscale (Bar-On, 1997b). Most of the items on the Empathic Concern subscale of the IRI (Davis, 1980, 1983) seem to measure this concept. Empathic Concern is different from Responsive Distress, in that the focus remains on the other person: the respondent feels sympathy or concern for the other person, rather than feeling sad or angry or fearful because the other person feels that way. Thus, these two constructs can be distinguished on logical grounds. In addition, research with the IRI (Davis, 1980, 1983) did find that items on that scale form separate factors for these two constructs. Therefore, my list of subcomponents of the ESI area distinguished between (12) Responsive Distress, (13) Responsive Joy, and (14) Empathic Concern.

Subjectivity in the Selection of the Subcomponents

As explained above, the inclusion of these particular subcomponents is idiosyncratic. Others who have thought about Emotional Intelligence or Social Intelligence or read the literature on these topics have included different subcomponents. Therefore, I will briefly address the extent to which the validity of my (and their) research depends upon the subcomponents selected.

Any time we form a single overall composite score to summarize our variables, the meaning of the composite score is dependent upon the component measures included. Therefore, the validity of any research that uses overall summary scores (such as total scores) as an index of Emotional Intelligence (or Social Intelligence, or Empathy, or Alexithymia) depends upon the careful selection of subcomponents. Previous research in these areas has often involved overall composite scores. However, most of this research has also reported results for individual subcomponents, and in most cases, these individual results are not influenced by the other components included. My research did not involve the calculation of an overall composite score of ESI, and therefore this concern does not apply.

Any time we use optimal combinations of variables, the overall results and the results for the individual measures depend upon each of the variables selected for inclusion. Multiple regression, discriminant analysis, canonical correlation, and factor analysis all depend upon the construction of optimum linear combinations, and therefore the results will depend upon the particular measures included. Three of the analyses I undertook involved factor analyses of ESI measures, and the results I obtained from those analyses are therefore conditional upon the measures included. Other factor analytic research (such as Davies et al., 1998; and Mayer et al., 2000) also depends upon the measures included.

Finally, any time we study a particular topic using a particular set of measures we may have difficulty generalizing our findings to constructs or measures not studied. For example, if every ESI measure I studied was correlated with Extraversion, it would still be inappropriate to generalize this finding to constructs I did not measure, such as Delay of Gratification or Motivation. I therefore refrained from making any conclusions about subcomponents not included or about the ESI area in general. On the other hand, it would be easier to generalize findings to a narrower construct. If each of my measures of Emotional Understanding was correlated with Extraversion, for example, I might conclude that Emotional Understanding itself (and not just the measures of Emotional Understanding I included) is correlated with Extraversion, and that other measures of Emotional Understanding could be expected to show this same correlation. Alternatively, if every self-report measure of ESI that I study had large correlations with Socially Desirable Responding (SDR), I might conclude that self-report measures of ESI (and not just the self-report measures I studied) are correlated with SDR. Any such generalizations would have to be made quite carefully in an area such as ESI, however, given that there is no agreed upon set of basic constructs within which results might be expected to generalize.

In summary, the arbitrary nature of my selection of ESI subcomponents is relevant to the validity of three of my analyses: the dimensional structure of ESI, the factor analytic examination of the relation of ESI to other types of cognitive abilities, and the factor analytic examination of the relation of ESI to the Big Five dimensions of personality. The factors that result from the first of these analyses were also used in some of the other analyses (along side the original variables), and the reader should keep in mind the tentative nature of these factors.

Cognitive Subcomponents and Personality Subcomponents

There are many ways in which one individual differs from the next. These differences can be divided into three broad domains: ability, personality, and motivation. This division can be traced back to Plato, but did not receive an operational definition until the last century. Cattell (1946; Cattell & Warburton, 1967) proposed that these three domains can be distinguished as follows: abilities are those factors that change most with changes in complexity; motivational traits are those that change most with changes in incentive; and personality traits are those that change least with either types of manipulation. In practice, Cattell (1971) also distinguished personality traits from cognitive abilities by examining correlations with known cognitive abilities and personality dimensions, and by examining the breadth of influence of a trait (he assumed that personality dimensions influence behaviours on a wider variety of measures than cognitive abilities do). Guilford (1959) defined these three domains somewhat differently: motivational traits have to do with *what* a person does, aptitudes pertain to *how well* a person does it; and personality traits pertain to *the manner* in which the person does it. Despite the differences in the verbal definitions offered, Cattell and Guilford would likely have agreed upon the classification of particular traits, in most cases.

Many of the early researchers, men such as Raymond B. Cattell, J. W. French, J. P. Guilford, and John Horn, conducted research in all three of these domains, but later psychologists have tended to specialize within a single area. Perhaps because of this, current debates center not on how to distinguish these three areas from each other, but instead on providing more precise definitions of each. For example, contemporary researchers debate whether intelligence is best defined as problem-solving ability, knowledge, adaptability to the

environment, that which is valued by the culture, the ability to learn, or a higher-order factor derived from existing intelligence tests and referred to as *g* (Sternberg & Berg, 1986).

Although all three domains (ability, personality, and motivation) influence any particular behaviour (or test score), they usually do so in different proportions (Cattell, 1973a). Because of this, many tests measure traits in just one of these three domains. All three types of traits can be measured with self-report questionnaires, ratings by knowledgeable others, and maximum-performance tests, but maximum-performance tests are usually the preferred method of assessing cognitive abilities (see, e.g., Cattell, 1973b; Paulhus, Lysy, & Yik, 1998; Wong et al., 1995). When early researchers needed to categorize individual tests as measures of cognitive abilities or personality dimensions without reference to the correlations of these tests with other criteria, they often made this distinction based on whether the instrument was a maximum-performance test or some type of rating (see e.g., Cattell, 1973b; French, 1971).

In order to design my research studies, I needed to tentatively distinguish between those ESI subcomponents that appear to be cognitive abilities and those that are personality dimensions, before collecting any data. I used two criteria. First, if no maximum-performance tests of the construct existed, this suggested that other researchers agree that this is a personality dimension and not a cognitive ability. With the exception of Social Insight, each of the first seven subcomponents is measured by at least one subscale of the MSCEIT (Mayer et al., 1999) and at least one subscale of the MEIS (Mayer et al., 2000), both of which attempt to measure various aspects of a cognitive model of Emotional Intelligence. Social Insight is measured by three of the OGSI tests. In contrast, none of the latter seven subcomponents of ESI have been included by explicitly cognitive models of Emotional Intelligence or Social Intelligence (e.g., MSCEIT Mayer et al., 1999; Mayer et al., 2000; O'Sullivan & Guilford, 1976), and no maximum-performance tests of these concepts were found. Therefore, according to this criterion, the first seven subcomponents in Table 1 would be categorized as cognitive and the latter seven as personality dimensions.

Second, I considered claims made by the test designers about the nature of the construct they were attempting to measure. If the test designers argued that they were measuring a cognitive ability or type of intelligence, this suggests that the subcomponent is cognitive in nature. According to this criteria, Emotional Integration, Recognizing Emotions in Others, Perception of Emotions in Objects, Social Insight, Managing Emotions in the Self, and Managing Emotions in Others would be considered cognitive, and the latter seven subcomponents in Table 1 would be considered personality. Understanding Emotions could be either cognitive or personality, however. Most of the tests in this section were intended as measures of some type of cognitive ability. However, the Toronto Alexithymia Scale (TAS-20) was not designed as a cognitive measure. It was designed as a measure of a clinical condition: alexithymia. Its authors have recently completed research examining the relation of the TAS-20 to various personality dimensions (Luminet, Bagby, Wagner, Taylor, & Parker, 1999), suggesting that their test measures a personality variable. However, because the majority of tests of this subcomponent were designed as cognitive ability measures, Understanding Emotions was classified as a cognitive ability.

These two criteria—existence of maximum-performance tests and stated purpose of the test developers—therefore converge in suggesting that the first seven subcomponents in

Table 1 are cognitive in nature, while the latter seven are personality dimensions. This division was used in designing my research studies.

The Relation of the Subcomponents to Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia

How are these 14 subcomponents related to models and measures of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia? All of these subcomponents can be found in models and measures of these four constructs, as has been demonstrated above. However, no single model or measure of Emotional Intelligence, Social Intelligence, Empathy, or Alexithymia includes all 14 of these subcomponents. Furthermore, it would be impossible to select the subcomponents that belong to each of these four areas, given conflicts among the definitions used in each of those areas. For example, some models of Emotional Intelligence would include Social Insight, whereas others would not. Some would include Emotion-Based Decision-Making or Responsive Distress, but others would not. Similarly, some models of Social Intelligence would include Positive Expressivity and Negative Expressivity, Responsive Distress, or Responsive Joy, and others would not. Such differences among models are also found in the areas of Empathy and Alexithymia.

In sum, there is no simple relation between the 14 subcomponents of ESI and the four constructs of Emotional Intelligence, Social Intelligence, Empathy and Alexithymia. These subcomponents are related to the larger area of ESI. At present, current models and measures of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia are idiosyncratic combinations of these (and other) subcomponents.

Because of this, I believe it will be much more fruitful if we focus our research at the level of these subcomponents or at the level of the individual measures. Using this approach, we will be able to determine *empirically* whether these subcomponents are related to higher-order constructs that resemble current definitions of Emotional Intelligence, Social Intelligence, Empathy, or Alexithymia. Until such relations are established, however, it seems more fruitful to focus research (and theorizing) at the subcomponent or subtest levels. In this dissertation, I analyzed results at the level of the individual measures.

Procedures Employed to Control Type 1 Error

This dissertation was quite broad. As described in the overview, I addressed five research questions related to ESI and its measurement. Furthermore, ESI is multi-faceted and 14 different subcomponents of ESI were examined. The breadth of this research resulted in the use of literally thousands of significance tests. With such a large number of tests, many will be significant even when the null hypotheses are true. Procedures were therefore needed to ensure that my conclusions were not based on a large number of Type 1 errors. Several strategies were used to ensure this.

First, whenever I conducted a large number of significance tests at once, I calculated the number of these that would be expected to be significant, if all of the null hypotheses were true, and I used this information in interpreting my results. If a Type 1 error rate of .05 were used for each of 100 tests, for example, 5 of these would be expected to be significant by chance. If I were to find that only 5 or 6 of these tests were significant, I would conclude that these significant results could be attributed to Type 1 errors; if I were to find that 20 of these were significant, this would be many more than would be expected by chance and I would conclude that at least some of these significant results were not Type 1 errors. The results of these analyses are reported in the text for any situation where the number of

significant results was relatively close to the number that would be expected by chance. In any situation where it is not clear whether the number of significant findings is more than would be expected by chance, the binomial distribution could be used to determine the approximate probability of obtaining the specified number of significant findings. Fortunately, this more detailed analysis was not needed in this dissertation.

Second, my major conclusions were made by integrating the results of several different analyses. Converging evidence—rather than individual significance tests—were used to make conclusions. Where results were contradictory, I refrained from making a conclusion.

Third and most important, I adjusted the Type 1 error rate used for individual significance tests, based upon the reason for conducting the test. In the next few paragraphs, I will describe the different classes of significance tests in this dissertation and the Type 1 error rates used for each.

The most important class of significance test in this dissertation consisted of those tests upon which my research conclusions regarding ESI were based. These will be called Class A significance tests and included 396 tests on the significance of a correlation coefficient, as well as 38 tests on the significance of the difference between two correlation coefficients (e.g., is a particular measure of ESI more highly correlated with intelligence variables or personality variables?). These significance tests are found in Chapters 3 and 6. Because of the importance of avoiding Type 1 errors when making substantive conclusions, a Type 1 error rate of .001 was used for each of these significance tests. Across my entire dissertation, the probability that I have made a Type 1 error in one of these tests is less than .434. Because these 434 significance tests are not independent, the thesis-wide Type 1 error rate may be substantially less than .434. Most likely, I have made either 0 or 1 Type 1 errors in these 434 significance tests.

The most frequent type of significance test in this dissertation consisted of those tests that were not used to draw conclusions regarding ESI, but that were provided for the information of the reader. These will be referred to as Class B significance tests. There were three types of these significance tests. First, as part of the descriptive statistics for each of my variables, I compared the means and variances for men and women. There were 110 different variables, for a total of 220 significance tests. Second, I provided the correlation matrices upon which the factor analyses were based. The presented matrices contain 2238 unique correlations, and the significance of these correlations was noted for the interested reader. Third, I calculated 385 correlations between intelligence, personality, and Socially Desirable Responding variables (to provide a baseline against which to judge the correlations of those variables with measures of ESI), and noted the significance of these correlations for the interested reader. Altogether, then, there were 2843 Class B significance tests. Although none of these significance tests were used to make conclusions regarding ESI, I wished to prevent readers who are interested in these correlations from making an excessive number of Type 1 errors. Therefore, each of these significance tests used a Type 1 error rate of .01. Throughout this dissertation, approximately 28 of these tests would be expected to be significant by chance alone. Individual readers, however, will likely be particularly interested in only a small handful of these correlations, and therefore this Type 1 error control is considered adequate.

In Chapter 3, each ESI variable was correlated with measures of intelligence, personality, and Socially Desirable Responding, and these 365 correlations were examined in detail. Pooling the data for men and women allowed me to obtain the largest possible sample size, but would have been inappropriate if these correlations were different for men and women. Because these 365 correlations do not form a symmetric correlation matrix, there is no existing multivariate technique for comparing these correlations for two independent groups. Therefore, to ensure that pooling was allowable, univariate significance tests comparing the correlations for men with the correlations for women were conducted. A Type 1 error rate of .01 was used for each of these 365 significance tests. Eleven of these tests were significant, which was quite a few more than the three or four that would be expected by chance if there were no differences between the correlations for men and women. Therefore, I concluded that some of these correlations were different for men and women, and used significance at the .01 level as the criteria for determining whether pooling was acceptable. Using a larger Type 1 error rate would have been more conservative, because it would have more effectively prevented unjustified pooling. However, if a Type 1 error rate of .05 had been used, then approximately 18 of these comparisons would have been significant by chance alone. Analyzing the data separately for men and women for those 18 correlations would have resulted in an unnecessary loss of power when comparing these correlations with other correlations. This is why a Type 1 error rate of .01 was used. These univariate significance tests will be referred to as Class C tests.

Multivariate statistical tests were also sometimes used to determine if I could pool data from different groups. There were two types of these Class D tests. First, I divided subjects into groups based on their familiarity with English and compared these groups using a series of 12 MANOVA's to determine if data from the different groups could be pooled. Second, for each factor analysis I used significance tests to determine if the means or variance-covariance matrices for men and women were different: if they were different, this would require me to mean-deviate the data within sex before pooling the data, or to run separate analyses for men and women. Three Hotelling (1931) T^2 tests and three Box (1949) tests were used. For each of these tests, a Type 1 error rate of .05 was used. In this situation, because I wanted to be able to pool my data, using a lower Type 1 error rate would have been liberal—not conservative. Therefore, the more conservative .05 was used.

There was a second situation in which I wished to retain the null hypothesis. This occurred when I was attempting to demonstrate the discriminant validity of my measures: i.e., that they were uncorrelated with tests of unrelated constructs. For example, if I was trying to demonstrate that a test measures a cognitive ability, I needed to show than none of its correlations with the personality variables was significantly larger than would be expected for a cognitive ability test. Using a low Type 1 error rate for these tests would have allowed me to retain the null hypothesis frequently, but would have been a very liberal strategy. Therefore, the more conservative Type 1 error rate of .05 was again used. A total of 396 correlations were examined for evidence of discriminant validity and will be referred to as Class E tests. These were the same correlations as were examined using the Class A significance tests. The Class A and Class E tests were different in three ways: (a) the purpose of the significance tests, (b) the null hypotheses being tested, and (c) the Type 1 error rate used.

Finally, one of the methods of determining the number of factors to extract in a factor analysis uses a significance test. These Class F tests were each run using a Type 1 error rate of .05. Using some other Type 1 error rate would likely have resulted in too many or too few factors being suggested.

Because a variety of Type 1 error rates were used, I will remind the reader of the Type 1 error rate being used for any particular significance test in the appropriate section.

Using these procedures to ensure that Type 1 errors did not have a large influence on the conclusions I made was a conservative strategy, and will necessarily have reduced the power of my statistical tests. This strategy was selected for two reasons. First, this will have increased the replicability of my findings. Relationships that I repeatedly found significant at the .001 level are likely to replicate in future research. Second, the use of stringent Type 1 error rates simplified interpretation of the patterns of results. If I had used a higher Type 1 error rate for my most important statistical tests (the Class A tests), I would have obtained many more significant findings: determining the general conclusions to be made from that many significant findings would have been a highly subjective process. Using a Type 1 error rate of .001 resulted in patterns of findings that were quite clear, so that I am confident in the general conclusions I drew, we well as in conclusions of individual significance tests.

CHAPTER 2: THE DIMENSIONAL STRUCTURE OF EMOTIONAL AND SOCIAL INTELLIGENCE

Background

Most researchers agree that ESI is not a homogeneous trait. Research on the dimensions that underlie this domain, however, has only just started. I know of no research that has examined the underlying structure of Emotional Intelligence, Social Intelligence, Empathy, Alexithymia, or ESI, using instruments that cover a wide range of ESI subcomponents developed by a variety of researchers. However, there is one article, Davies et al. (1998), that examined dimensions that underlie a number of different ESI measures. Davies et al. (1998) did not select their measures systematically to cover a wide range of ESI subcomponents; however, enough measures were included so that some information about the dimensional structure of this domain can be obtained. Their study was designed to explore the relation of Emotional Intelligence to Social Intelligence, personality, and traditional cognitive abilities using a series of factor analyses. However, their results are potentially relevant to four of my research questions: the dimensional structure of ESI, whether ESI subcomponents are types of intelligence or personality dimensions, and the relation of ESI subcomponents to other types of intelligence and to personality dimensions. I will provide an overview of this study here, and will summarize relevant results in each of the appropriate chapters below.

The Davies et al. (1998) article included three studies, each of which examined the relation of measures of ESI to intelligence and personality. In the first study, a factor analysis was conducted with 20 ESI measures, 6 measures of intelligence, and 3 measures of personality (Psychoticism, Extraversion, and Neuroticism). In the second study, they factor analyzed 7 ESI measures, 10 cognitive measures, and 26 personality measures. In the third, they factored 4 ESI measures, 4 cognitive measures, 5 personality measures, and 4 other measures. The first and last of these studies were each conducted with 100 psychology undergraduates, while the second used 300 U.S. Air Force Recruits.

Some information about the dimensional structure of ESI can be gleaned from the first of their studies, because it included 20 different ESI measures. When factor analyzed along with a number of other variables, the ESI measures loaded on six factors. Davies and his associates interpreted three of these factors as different aspects of Emotional Intelligence. They labeled them Emotional Clarity, Emotional Awareness, and Emotion Perception. In terms of my subcomponents, these correspond to Emotional Understanding, Attending to Emotions, and a combination of Recognizing Emotions in Others and Perception of Emotion in Objects. These factors had very small positive intercorrelations, further indicating that they are empirically distinguishable.

This study was not ideal for examining the dimensional structure of ESI, however. They proposed that Emotional Intelligence includes four subcomponents, but measured two of these with only a single measure each. Their failure to find these four subcomponents, then, can be at least partially attributed to their research design, which—as I mentioned—was not intended to provide a dimensional analysis of Emotional Intelligence or ESI.

The Davies et al. article is the only research I know of that has examined the dimensions underlying responses on a variety of ESI measures. There are, however, several studies that have examined the dimensional structure of particular scales. I will describe three of these studies.

The 33EI is a 33-item self-report measure of Emotional Intelligence, developed by Schutte et al. (1998). Petrides and Furnham (2000) found 4 factors for this scale, and labeled them optimism/mood regulation, appraisal of emotions, social skills, and utilization of emotions. In terms of my subcomponents, the first three of these factors appear to represent combinations of my subcomponents, while the last factor falls outside the subcomponents that I identified.

Mayer et al. (2000) conducted a factor analysis of the 12 subscales of the MEIS. They found three factors: perception of emotions, understanding of emotions, and managing emotions. In terms of my subcomponents, these factors represent (a) a combination of Recognizing Emotions in Others and Perception of Emotions in Objects, (b) a combination of Emotional Understanding and Emotional Integration, and (c) a combination of Managing Emotions in the Self and Managing Emotions in Others.

Finally, Bar-On (1997b) conducted an item-level principal component analysis (with varimax rotation) of his self-report inventory, the EQ-i. The thirteen factors were: (a) self-contentment, (b) social responsibility, (c) impulse control, (d) problem solving, (e) emotional self-awareness, (f) assertiveness/independence, (g) flexibility, (h) anger control, (i) stress tolerance, (j) enjoyment, (k) interpersonal relationship, (l) empathy, and (m) reality testing. These factors corresponded fairly well to the 15 subscales of the EQ-i. Although most of the concepts are unique to this model and fall outside the subcomponents I identified, the fifth of these may be a combination of Emotional Understanding and Attending to Emotions, while the twelfth may be a combination of Recognizing Emotion in Others, Responsive Distress, Responsive Joy, and Empathic Concern.

In summary, there has been no research that has systematically attempted to determine the dimensional structure of the ESI (or Emotional Intelligence) area. Either the studies have examined only the internal structure of a single measure, or they have not included a variety of different measures in an attempt to span the entire area. However, some dimensions have been found more than once. These correspond to (a) Emotional Understanding, (b) Attending to Emotions, (c) Recognizing Emotions in Others and Perception of Emotion in Objects, and (d) Managing Emotions in the Self and Managing Emotions in Others. Further research is needed to replicate these dimensions, to determine if all of these dimensions are separate from each other, to determine if additional distinctions can be made within these dimensions, and to identify other important dimensions.

Research Question

From the above literature review I concluded that although most researchers agree that ESI is not a homogeneous trait, systematic study of the dimensions that underlie responses on ESI measures has not been undertaken. This lead to the following:

What dimensions underlie responses on ESI measures?

Research Approach

Two approaches can logically be used to determine the number and nature of dimensions that underlie a certain domain. First, an entirely empirical approach can be used. In this method, all available measures are administered to a large sample and are factor analyzed. This approach can be excessively time-consuming if a large number of measures exist, although it does have the advantage of being thorough.

Second, a purely rational approach can be taken, with a researcher simply examining the literature on models and measures in a domain, and listing the relevant dimensions. This

was the approach to Emotional Intelligence taken by Bar-On (1997b) and Salovey and Mayer (1990), for example. This approach has the advantage of speed and convenience, but the disadvantage that it is not based on empirical results.

Given the number of ESI measures available, and the fuzziness of the boundaries between ESI and other concepts, a purely empirical approach was considered impractical. Therefore, I decided to combine the two approaches in my research. First, I selected the aspects of ESI that appeared to be most important (the 14 subcomponents described in the Introduction) and second, I conducted a factor analysis.

Seven of the ESI subcomponents appeared to be cognitive in nature and were measured by at least two different instruments. Factors that result from an analysis of these variables could represent new types of intelligence, and therefore are of great theoretical interest. The remaining seven appeared to be personality dimensions and were usually measured by only a single self-report questionnaire. A factor analysis that included these questionnaires would be unable to determine if they formed separate factors. Because of the scarcity of measures of the personality subcomponents of ESI, the personality subcomponents were excluded from the dimensional analysis. Future research could explore the dimensional structure of the personality subcomponents of ESI, using item-level factor analysis.

As the reader will recall from my earlier discussion, the results of any procedure that uses optimal combinations of variables (such as factor analysis) depend upon the particular variables included. For example, if I had included only a single measure of Emotional Understanding (or any of the personality aspects of ESI), it would have been impossible for me to obtain a well-identified factor of Emotional Understanding. Some differences between my results and the results of previous factor analyses in this area were therefore expected, because previous analyses included different variables.

Hypotheses

Based on the empirical and logical distinctions between different ESI measures that I described above and in the introduction, I hypothesized that the cognitive ESI measures represent seven factors: (a) Emotional Understanding, (b) Emotional Integration, (c) Recognizing Emotions in Others, (d) Perception of Emotions in Objects, (e) Social Insight, (f) Managing Emotions in the Self, and (g) Managing Emotions in Others. However, based on previous empirical results, I hypothesized that there may be as few as four factors: (a) Emotional Understanding (a combination of Emotional Understanding and Emotional Integration), (b) Emotional Perception (a combination of Recognizing Emotions in Others and Perception of Emotion in Objects), (c) Social Insight, and (d) Managing Emotions (a combination of Managing Emotions in the Self and Managing Emotions in Others). In fact, because previous research has not examined the relation of Social Insight to these other factors, there may be as few as three factors.

Method

UBC students completed measures to answer four separate research questions. For ease of reference, the methodology of the entire study will be described here, although only the demographic and ESI measures were used to answer this research question.

Participants: UBC Student Sample

Participants were recruited from two sources. First, participants were recruited from the UBC Psychology Subject Pool. These participants were offered 2 course credits to participate in a two-hour study, and were given all the measures listed in Table 2 (the 12

intelligence tests), as well as the ESI measures listed in Table 3 (referred to as Set 1). A total of 254 participants completed this study between September 1999 and April 2000.

Once these participants had completed this two-hour study, they were asked to participate in a separate one-hour study, for the chance to win $1000 or a new computer and the opportunity to receive feedback on their personality. If they were willing to participate, they were asked to complete the measures in Table 4 (referred to as Set 2), and to give their name and student number so that we could match their results with their results from the Subject Pool study. Thirty-five students elected to participate in this one-hour study.

Two separate studies were run because Psychology Subject Pool participants are allowed a maximum of 2 credits for their participation in any one study, and this effectively puts a two-hour limit on any study conducted in the Psychology Subject Pool.

In addition, the instructor of two sections of an upper-level psychology course allowed me to advertise my study during class time. Those participants were asked to complete all of the measures listed below in Tables 2, 3, 4, and 5. They completed two half-hour take-home questionnaires, a one-hour testing session of the intelligence tests, and a one-and-a-half-hour testing session containing the remaining measures. In return, these participants received feedback on their personality and their Emotional Intelligence, were given short presentations on intelligence and Emotional Intelligence, and received bonus course credits. A total of 160 students from the two sections participated between September and December, 2000.

Measures

All participants completed demographic measures of sex, age, English Language Proficiency, and Ethnicity. In addition, participants completed a cognitive battery, personality measures, and a number of ESI measures.

Cognitive Measures

All participants completed a short battery of intelligence tests. Two types of intelligence were selected to measure Fluid Intelligence, one's problem solving ability: Inductive Reasoning and Visualization. Inductive Reasoning is the ability involved in forming and trying out hypotheses to determine what rule is being used in some specific situation. Visualization is the ability to manipulate or transform the image of spatial patterns into other arrangements. Two types of intelligence were selected to represent one's accumulated knowledge, Crystallized Intelligence: Verbal Ability and Verbal Closure. Verbal Ability is the ability to understand language. In this study, because all measures were paper and pencil tests, this is the ability to understand written English. Verbal Closure is the ability to identify visually presented words when some of the letters are missing, scrambled, or embedded among other letters. Three measures were selected for each of these types of intelligence. These measures are described in Table 2.

My goal was to administer these 12 intelligence tests in a total of 60 minutes. Thus, these tests were allowed an average of 5 minutes each, with approximately 1 minute for instructions and 4 minutes for working time. Several measures were shortened to fit within these time limits (see Appendix C). However, testing was slower in a large group because the group had to wait for all of the participants to finish reading the instructions before each test could begin.

Table 2
Intelligence Tests Administered to All Participants in the UBC Student Sample

Measure	Definition
Verbal Ability (VA)	
Advanced Vocabulary Test[a]	This is a five-choice synonym test consisting mainly of difficult items.
Inventive Opposites[b]	The participant is asked to complete two words that are opposite in meaning from a given word, given the first letter of each of the answers.
Reading I[b]	The participant is asked to mark two out of four possible responses that are similar in meaning to the given proverb.
Verbal Closure (VC)	
Rearranged Words[c]	For each item, the participant is asked to write a common English word from a group of five scrambled letters. Modeled after the test by Ekstrom, French, and Harman (1976) that uses four-letter words.
Hidden Words[a]	The participant is asked to find and circle one or more four-letter words in apparently random lines of letters.
Incomplete Words[a]	The participant is asked to provide one or more letters to complete common words.
Visualization (VZ)	
Form Board[a]	Each item presents 5 pieces, some or all of which can be put together to form a figure presented in outline form. The participant is asked to indicate which of the pieces, when fitted together, would form the outline.
Paper Folding[a]	For each item, successive drawings illustrate two or three folds made in a square sheet of paper, with the final drawing showing where a hole is punched. The participant is asked to indicate which of five drawings shows how the punched sheet will appear when unfolded.
Surface Development[a]	Drawings are given of three-dimensional forms that can be made with paper. With each is a diagram showing how a piece of paper might be cut and folded to make the form. The participant is asked to indicate correspondences between the diagram and the three-dimensional form.
Inductive Reasoning (IR)	
Letter Sets[a]	Five sets of four letters are presented. The participant is asked to find the rule that relates four of the sets to each other, and then to mark the one that does not fit the rule.
Figure Classification[a]	Each item presents 2 or 3 groups of geometrical figures. The participant is asked to discover the rule that governs group membership, and then apply this rule to a second line of figures.
Number Series[b]	For each item, the participant is asked to provide two missing numbers in a series of six to nine numbers.

Note. Shortened versions were used for most of these tests. See Appendix C.
a. Ekstrom, French, and Harman (1976).
b. Thurstone (1934).
c. Created by Kim Barchard, modeled after the Scrambled Words test from Ekstrom, French, and Harman (1976).

Table 3
Cognitive ESI Measures Administered to All Participants in the UBC Student Sample (Set 1)

Measures	Subscales	Scoring Method[a]
Emotional Understanding		
MSCEIT*	C Blends	MP consensus
	D Progressions	MP consensus
	H Transitions	MP consensus
	L Analogies	MP consensus
Levels of Emotional Awareness	5 item version	MP open-ended
TAS-20	Difficulty Describing Feelings	Self-report
	Difficulty Identifying Feelings	Self-report
TEIS	Emotional Appropriateness	MP-Self-report hybrid
Emotional Integration		
MSCEIT	B Synesthesia	MP consensus
	G Facilitation	MP consensus
	K Sensation Translation	MP consensus
Recognizing Emotions in Others		
MSCEIT	A Faces	MP consensus
OGSI	Expression Grouping part I	MP multiple-choice
TEIS	Recognition of Emotion in Others	Self-report
Perception of Emotions in Objects		
MSCEIT	F Landscapes	MP consensus
	J Designs	MP consensus

* These abbreviations are explained in Appendix A, and descriptions of these measures are given in Appendix B.
a. These scoring methods are described below, in the section entitled "Scoring the ESI Measures".
MP = Maximum-performance.

Table 4
Additional Cognitive ESI Measures Administered to Some Participants in the UBC Student Sample (Set 2)

Measures	Subscales	Scoring Method[a]
Social Insight		
OGSI*	Cartoon Predictions part I	MP multiple-choice
	Missing Cartoons part I	MP multiple-choice
	Social Translations part I	MP multiple-choice
Managing Emotions in Self		
TMMS	Repair	Self-report
TEIS	Regulation of Emotion in the Self	Self-report
MSCEIT	I Emotion Management	MP consensus
Managing Emotions in Others		
TEIS	Regulation of Emotion in Others	Self-report
MSCEIT	E Emotions in Relationships	MP consensus

* These abbreviations are explained in Appendix A, and descriptions of these measures are given in Appendix B.
a. These scoring methods are described below, in the section entitled "Scoring the ESI Measures".
MP = Maximum-performance.

Table 5
Personality ESI Measures Administered to Participants in the UBC Student Sample

Construct	Scale	Subscale Used	Scoring Method
Attending to Emotions	Trait Meta Mood Scale (TMMS)	Attention	Self-report
Emotion-Based Decision-Making	Tett's Emotional Intelligence Scale (TEIS)	Flexible Planning	Self-report
Empathic Concern	Interpersonal Reactivity Index (IRI)	Empathic Concern	Self-report
Responsive Distress	Tett's Emotional Intelligence Scale (TEIS)	Empathy	Self-report
Responsive Joy	Quick Scale of Empathy (QSE)	Positive Sharing	Self-report
Positive Expressivity		Positive Expressivity Scale*	Self-report
Negative Expressivity		Negative Expressivity Scale*	Self-report

* The Positive Expressivity and Negative Expressivity Scales are original scales, and are given in Appendix B.

Measures of Personality and Socially Desirable Responding

Goldberg (1999a, 1999b) created 10-item public-domain measures of constructs similar to the 30 NEO-PI-R facets (Costa & McCrae, 1992) of the Five-Factor Model of personality, using items from the International Personality Item Pool (IPIP; Goldberg, 1999b). Participants from the upper-level psychology class completed 8-item versions of 23 of these scales. These 23 scales were selected based on their apparent relevance to ESI, and are listed in Appendix D, Table D1. In addition, these participants completed the PDS: BIDR-7 (Paulhus, 1999), which has subscales to measure two separate aspects of Socially Desirable Responding: Impression Management and Self-Deceptive Enhancement.

Subject Pool participants who elected to return for the second study also completed the two subscales of the PDS: BIDR-7. In addition, they completed 10-item measures of the Big Five personality dimensions, taken from the IPIP (Goldberg, 1999a, 1999b). Because of the small number of participants who participated in this study, these personality data were not subsequently used. Instead, I relied upon the more detailed measures of personality collected in the upper-level psychology class.

Emotional and Social Intelligence Measures

Participants completed a variety of maximum-performance and self-report measures of ESI. Given the variety of ESI measures available, some explanation is needed for the measurement selection. For the cognitive subcomponents, my preference was to include maximum-performance measures. Therefore, with the exception of the exclusion of the MEIS (Mayer et al., 2000), every available maximum-performance measure was used. The MEIS was excluded because of the high degree of scale and item overlap with the MSCEIT (Mayer et al., 1999). The MSCEIT was designed as a replacement for the MEIS: therefore, there was no point in including both tests, and if only one was to be included, it made sense to include the revised test rather than the original. Using the MSCEIT and OGSI tests, I was able to obtain maximum-performance measures for each of the seven cognitive subcomponents.

To conduct a factor analysis of the cognitive subcomponents of ESI, I needed at least two and preferably three measures of each subcomponent. I also included some self-report measures when I already had three maximum-performance measures, because the inclusion of both maximum-performance and self-report measures allowed some examination of the effect of the different methods. I was impressed with the care that had gone into creating the TEIS (Tett, Wang, Gribler, & Martinez, 1997) subscales (e.g., item analysis including item-level examination of convergent and discriminant validity and balanced numbers of positively-keyed and negatively-keyed items) and therefore used those subscales whenever possible. This left two areas that did not have three measures: Managing Emotions in the Self and Managing Emotions in Others. A third measure of the first construct—the TMMS Repair subscale (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995)—existed. This subscale was created using item-level factor analysis and was therefore expected to have adequate psychometric properties. Unfortunately, no additional measures of Managing Emotions in Others were found.

No self-report measures of Emotional Integration, Perception of Emotion in Objects, or Social Insight were found, but self-report measures of Emotional Understanding did exist. I included the TAS-20 (Taylor et al., 1985) Difficulty Identifying Feelings and Difficulty Describing Feelings subscales as measures of this latter construct. These two subscales were

selected instead of other possible self-report measures of this construct because they have been used extensively to measure Emotional Intelligence and Alexithymia, and I therefore thought that an examination of the relation of these scales to other measures of ESI and to measures of intelligence and personality would be of general interest.

For most personality subcomponents, only a single self-report measure was available. Whenever the item content of the subscale matched the construct I intended to measure, these subscales were used. In two cases—Positive Expressivity and Negative Expressivity—no existing measure provided clear measurement of the desired construct, and I therefore drafted new ten-item scales. These scales are given in their entirety in Appendix B. In two cases—Attending to Emotions and Responsive Distress—there was more than one measure to choose from. One of Tett's subscales (Tett, Wang, Gribler, & Martinez, 1997)—Empathy—measured Responsive Distress and was selected over the alternatives because of the careful scale construction methods used. For Attending to Emotions, the TMMS Attention subscale was preferred over the SIPOAS Based on Body subscale, because there was no information about the scale construction methods used for the latter measure, but adequate documentation of item-level factor analytic scale construction for the former.

A total of 31 measures of ESI were thus selected: 24 for the cognitive subcomponents and 7 for the personality subcomponents. Because of time constraints, measures of the cognitive subcomponents were divided into two groups: those that measure central ESI subcomponents, and those that measure somewhat less central subcomponents. While all participants completed the measures of the most central cognitive subcomponents, listed in Table 3 and referred to as Set 1, only some participants (the upper-level psychology class students and the Subject Pool Participants who wished to participate in the second study) completed the remaining cognitive measures, listed in Table 4 and referred to as Set 2. This approach resulted in a large sample size for the most central cognitive subcomponents, but a somewhat smaller sample size for the other measures. Participants from the upper-level psychology class completed measures of the seven personality subcomponents of ESI, listed in Table 5. The items for the seven personality subcomponents were randomly intermixed to prevent participants from developing a response set during testing. Descriptions of each of the ESI measures used (and each of the ESI measures I considered but did not use) can be found in Appendix B.

Scoring the ESI Measures

Five methods of scoring were used with the ESI measures. I will describe each of these methods in turn.

Many measures are self-report. The majority of these use a five-point likert format, with response options ranging from Strongly Disagree to Strongly Agree. Two measures—the Positive Expressivity Scale and the Negative Expressivity Scale—use a five-point response scale describing the accuracy of self-descriptions, with response options ranging from Completely Inaccurate to Completely Accurate.

The TEIS Emotional Appropriateness subscale (Tett, Wang, Fisher et al., 1997) was designed to measure the ability to differentiate between similarly experienced emotions. It uses an unusual scoring method that I have labeled a hybrid of self-report and maximum-performance. Each of the 12 items is rated on a 5-point likert scale, where one end of the scale is considered to represent an appropriate emotional reaction to the given situation, and the other end is considered to be an inappropriate reaction. Thus, people might obtain low

scores on this measure either because they have unusual emotional reactions (a self-report interpretation) or because they do not know what emotions those situations would create (a maximum-performance interpretation).

The O'Sullivan and Guilford tests of Social Intelligence (O'Sullivan & Guilford, 1976) use multiple-choice questions. Expression Grouping and Missing Cartoons have four response options, while Social Translations and Cartoon Predictions have three response options.

The Levels of Emotional Awareness Scale (Lane et al., 1990) is an open-ended maximum-performance measure. Subjects are asked to describe how they would feel in several different emotionally-evocative situations. There is another person mentioned in each of these situations, and they are also asked to describe how that person would feel. Responses are scored according to the type and number of emotion-words used: thus the *structure* of the response but not the specific *content* is the basis for scoring. The following example is similar to the items on the Levels of Emotional Awareness Scale: "You are stopped at a red light when someone hits you from behind. How would you feel? How would the other driver feel?" If the respondent stated that they would feel "bad", they would receive a lower score than if they stated that they would feel "scared and angry", because the latter contains two non-synonymous specific emotion words, while the first contains just a single general emotion word. Separate scores are given for the responses for the self and the responses for the other. A total score is then calculated, and it was this total score that was used in the analyses presented here.

The 12 MSCEIT subscales (Mayer et al., 1999) use consensus scoring. In this method, one's score is equal to the proportion of the norm group who gave that response. Thus, if 10% of the norm group selected option 1 "No anger" for an item, the subject would obtain a score of .10 for selecting 1; if 28% of the norm group selected option 2, then the subject would obtain a score of .28 for selecting 2.

Consensus scoring can be contrasted with Expert scoring. In this method, a panel of experts examines each item, and agrees upon the correct answer. These two methods of scoring were compared using the precursor to the MSCEIT—the MEIS (Mayer et al., 2000). Consensus scoring resulted in higher internal consistencies for the 12 subscales and clearer factor results. As well, for three subscales (music, designs, and stories) it was possible to obtain "Target" ratings, representing the emotions felt and portrayed by the item creators, as rated by the creators. The correlation between the modal response from the norm group and target ratings was higher than the correlation between the correct answers assigned by the experts and the target ratings. For these reasons, Mayer and his colleagues preferred consensus scoring, and used this method of scoring when they developed the MSCEIT.

Data Screening

Data were collected from a total of 414 participants. Not all of this data were used, however. Many of these participants had English as a second language, and I was concerned that the written nature of the testing materials might effect the scores of at least some of these participants. This was a concern because many of the tests are designed to measure some type of intelligence, and the intelligence of some participants could be severely underestimated if they were tested in a language with which they were not very familiar. Therefore, I decided to exclude those participants for whom it appeared that the written

materials were creating a form of test bias. Failure to exclude such participants could result in inflated correlations between ESI tests and Verbal Ability.

I asked participants three questions regarding their familiarity with English: (a) their first language, (b) how long they had been speaking English, and (c) how comfortable they were reading and writing English, with 10 indicating "Perfectly Comfortable" and 1 indicating "Very UNcomfortable; it's a real struggle."

To determine if familiarity with English was influencing participants' scores, I divided participants into four groups, on the basis of these three questions. The first group contained those participants who had English as their first language. The second group had spoken English for at least 10 years, and rated themselves as 9 or 10 on the comfort scale. The third group had spoken English for at least 5 years, and rated themselves as 7 or higher on the comfort scale. Participants who were less familiar with English and those who could not be classified because of missing data were put into the fourth group.

Next, I looked for differences between these four groups in terms of the 12 intelligence tests. Participants who had been speaking English for a shorter period of time or who are less comfortable reading and writing English would be expected to obtain lower scores on intelligence tests related to English language skills, even if these tests were not biased in any way. Therefore, the tests of Verbal Ability and Verbal Closure were analyzed separately from the intelligence tests that were not related to English language skills—Inductive Reasoning and Visualization. In addition, I compared the means for the four groups on the 12 MSCEIT subtests (Mayer et al., 1999), and the 4 O'Sullivan and Guilford (1976) tests. There were thus a total of four separate MANOVA's: (a) the six tests of Verbal Ability and Verbal Closure, (b) the six tests of Visualization and Inductive Reasoning, (c) the 12 MSCEIT subscales, and (d) the 4 OGSI tests. The results of these four MANOVA are shown in the first part of Table 6.

As expected, the four groups differed in terms of their Verbal Ability and Verbal Closure. As well, the four groups differed in terms of their scores on the 12 subtests of the MSCEIT. However, the four groups did not have significant differences in terms of their Inductive Reasoning and Visualization, or their scores on the O'Sullivan and Guilford tests. There are differences, then, between the four groups. To what should we attribute these differences? Are some of the tests biased against people who are less familiar with written English, or are the people in this sample who are less familiar with English not as intelligent? Given the non-significance of the differences on the tests that used almost entirely non-verbal materials—the Inductive Reasoning and Visualization tests and the O'Sullivan and Guilford tests—it does not seem that the participants who are less familiar with English are simply not as intelligent. Instead, it appears that scores on the Verbal Ability and Verbal Closure test and scores on the MSCEIT subtests are influenced by lack of familiarity with written English. For the tests of Verbal Ability and Verbal Closure, this can be seen as evidence for the validity of these tests: people who are less familiar with written English should obtain lower scores on these tests. However, the MSCEIT subtests were not intended to measure familiarity with English. Therefore, I concluded that these tests may be biased against non-native speakers of English.

Table 6
MANOVA Comparison of the Four English-Familiarity Groups on the Maximum-Performance Tests

Groups[a]	Tests	Wilks Lamda	F	df_{num}	df_{den}	*p*
1, 2, 3, 4	3 Verbal Ability, 3 Verbal Closure	.683	8.64	18	1078	.000
	3 Visualization, 3 Inductive Reasoning	.971	.64	18	1123	.864
	12 MSCEIT Subscales	.580	2.78	36	494	.000
	4 OGSI Tests	.934	1.04	12	474	.410
1, 2	3 Verbal Ability, 3 Verbal Closure	.857	8.03	6	288	.000
	3 Visualization, 3 Inductive Reasoning	.990	.49	6	299	.813
	12 MSCEIT Subscales	.874	1.50	12	125	.133
	4 OGSI Tests	.986	.47	4	137	.756
1, 3	3 Verbal Ability, 3 Verbal Closure	.718	17.51	6	267	.000
	3 Visualization, 3 Inductive Reasoning	.985	.69	6	279	.655
	12 MSCEIT Subscales	.540	8.02	12	113	.000
	4 OGSI Tests	.934	2.22	4	125	.070
1, 4	3 Verbal Ability, 3 Verbal Closure	.785	10.23	6	224	.000
	3 Visualization, 3 Inductive Reasoning	.968	1.26	6	233	.274
	12 MSCEIT Subscales	.803	1.82	12	89	.057
	4 OGSI Tests	.988	.32	4	103	.864

a. Group 1: First language is English (n = 216); Group 2: Had been speaking English for 10 or more years and felt very comfortable reading and writing English (9 or more out of 10) (n = 93); Group 3: Had been speaking English for 5 or more years, and rated themselves as fairly comfortable reading and writing English (7 or more on a scale of 1 to 10) (n = 73); Group 4: Remaining participants (n = 32).

Note. Because I was using these significance tests to determine if I could pool groups, a Type 1 error rate of .05 was used to judge the significance of the results. However, given that 16 significance tests were run, the probability that at least one of these tests was significant by chance could be as high as .80. See pages 32 – 37 of the Introduction for the rationale for the Type 1 error rate used.

Given that the MSCEIT tests may be biased against people who are less familiar with English, I needed to consider whether I should include in my analyses *any* of the participants for whom English was not their first language. The MSCEIT tests appear to be biased against these people and other tests might also be affected. On the other hand, perhaps after long enough exposure to English, participants are sufficiently familiar with English that their scores on the MSCEIT are no longer being affected. I therefore repeated the above analyses, comparing each of the groups of non-native-English-users to the English-as-a-first-language group (group 1). These twelve additional MANOVA's are reported in the last three sections of Table 6. Looking at the results for the MSCEIT, I found that groups 1 and 2 were not significantly different ($p > .10$). The average difference in the scores on the MSCEIT subscales for groups 1 and 2 was .17 standard deviations or 2.1 points. Groups 1 and 3 did have significant differences on the MSCEIT subscales ($p < .001$), and the difference between groups 1 and 4 came close to reaching statistical significance ($p = .057$). I therefore concluded that scores on the MSCEIT are not substantially affected by lack of familiarity with English for those people who say they are very comfortable reading and writing English (9 or 10 on a 10 point scale) and who have been speaking English for 10 or more years, and that these participants could be included in my subsequent data analyses. Participants in groups 3 and 4, however, were excluded from all further analyses.

Final Sample

After data screening, I was left with 309 participants: 93 male, 210 female, 6 unspecified. Their ages ranged from 17 to 48, with an average of 20.3 and standard deviation of 3.6. The majority of participants identified themselves as Asian (50.8%) or White (39.1%), and most spoke English as their first language (70.2%). 190 of these participants had originally been recruited from the Psychology Subject Pool, and 119 from the upper-level psychology class. All 309 participants completed the Set 1 ESI measures, 149 completed the Set 2 ESI measures, and 119 completed the detailed personality measures.

Table 7 provides a summary of the three studies conducted with UBC students.

Descriptive Statistics

Table 8 gives descriptive statistics for each measure. Significant differences in the means and variances for men and women are indicated in the table.

Reliabilities

Cognitive Domain

The internal consistencies of the 12 intelligence tests were assessed using a subsample of 40 participants (see Table 9). Individual tests sometimes had low levels of internal consistency. For example, the shortened 8-item Figure Classification test had an internal consistency of .34, and the shortened 12-item Form Board test had an internal consistency of .46. In addition, to the extent that test scores are influenced by speededness, these numbers may over-estimate the extent of inter-item consistency.

Table 7
Summary of Studies Conducted with UBC Students

Study	Number Tested	Number Used	Measures Administered
Subject Pool (2 hours)	254	190	12 Intelligence Measures Set 1 ESI Measures Sex Age Ethnicity English Language Proficiency Measures
Second Study (1 hour)	35	30	Set 2 ESI Measures IPIP 10-item Big Five measures PDS: BIDR-7 Impression Management Self-Deceptive Enhancement
Upper-level class (4 hours)	160	119	12 Intelligence Measures Set 1 ESI Measures Set 2 ESI Measures Big Five 23 facets of the IPIP version of the NEO-PI-R 7 Personality Subcomponents of ESI PDS: BIDR-7 Impression Management Self-Deceptive Enhancement Sex Age Ethnicity English Language Proficiency Measures

Table 8
Descriptive Statistics for Each of the Measures in the UBC Student Sample

Measure	Sex	Sample Size	Mean	Standard Deviation	Skewness
Verbal Ability					
Advanced Vocabulary	Male	92	3.19	1.81	1.01
	Female	210	2.98	1.99	.64
Inventive Opposites	Male	92	10.53	3.59	–.20
	Female	210	10.57	3.35	–.17
Reading	Male	92	8.52	5.09	.47
	Female	210	8.68	4.94	.22
Verbal Closure					
Rearranged Words	Male	91	7.42	3.42	.12
	Female	202	8.30	3.40	.11
Hidden Words	Male	92	24.05	5.60	–.15
	Female	210	25.23	5.36	–.15
Incomplete Words	Male	90	10.93	2.71	.04
	Female	210	10.93	2.43	.12
Visualization					
Form Board	Male	92	29.26*	13.43	.39
	Female	210	24.55*	11.24	.19
Paper Folding	Male	92	6.58	2.31	–.34
	Female	210	5.75	2.43	–.23
Surface Development	Male	92	11.79	5.58	–.16
	Female	210	9.89	5.78	.25
Inductive Reasoning					
Letter Sets	Male	92	7.09	2.15	–.37
	Female	210	7.11	2.02	–.63
Figure Classification	Male	92	35.95	12.25	–.09
	Female	210	36.99	10.96	–.52
Number Series	Male	92	13.96	4.66	.00
	Female	210	11.62	4.19	.22

* $p < .01$.

Table 8 con't

Measure	Sex	Sample Size	Mean	Standard Deviation	Skewness
MSCEIT Subtests					
MSCEIT A	Male	93	97.47	14.97	–1.30
Faces	Female	209	100.66	15.09	–2.02
MSCEIT B	Male	93	104.42	11.45	–1.12
Synesthesia	Female	209	105.01	10.29	–.60
MSCEIT C	Male	93	102.56	12.58	–1.34
Blends	Female	209	104.77	11.20	–.87
MSCEIT D	Male	93	101.88	12.58	–.73
Progressions	Female	209	106.57	11.48	–.83
MSCEIT E	Male	47	103.11	7.60	–.89
Emotions in Relationships	Female	96	106.25	8.47	–.86
MSCEIT F	Male	92	99.49	16.03*	–1.48
Landscapes	Female	208	102.41	11.83*	–.98
MSCEIT G	Male	92	101.50	11.23	–.91
Facilitation	Female	208	104.95	9.68	–.87
MSCEIT H	Male	92	101.58	12.71	–.95
Transitions	Female	208	104.52	10.59	–.96
MSCEIT I	Male	46	101.04	9.74	–.65
Emotion Management	Female	95	106.00	8.00	–.88
MSCEIT J	Male	93	95.07	21.60	–2.14
Designs	Female	208	101.13	15.49	–2.64
MSCEIT K	Male	90	101.28	11.30	–.68
Sensation Translation	Female	206	105.37	10.11	–.91
MSCEIT L	Male	90	99.24	14.78	.14
Analogies	Female	203	103.24	13.68	.04

* $p < .01$.

Table 8 con't

Measure	Sex	Sample Size	Mean	Standard Deviation	Skewness
O'Sullivan and Guilford Tests					
Cartoon Predictions	Male	47	11.91	1.78	–.49
	Female	95	12.00	1.74	–.58
Missing Cartoons	Male	47	9.62	2.41	–.53
	Female	95	9.33	2.36	–.28
Social Translations	Male	47	8.89	2.01	–1.77
	Female	94	9.02	2.03	–2.28
Expression Grouping	Male	93	9.41	1.96	–.56
	Female	209	9.17	2.04	–.05
Other ESI Tests					
Levels of Emotional Awareness Scale	Male	93	3.72	.49	.14
	Female	210	3.86	.52	.03
TAS-20 Difficulty Describing Feelings	Male	93	2.75	.84	.39
	Female	208	2.69	.90	.24
TAS-20 Difficulty Identifying Feelings	Male	93	2.24	.68*	.45
	Female	208	2.41	.78*	.37
TEIS Emotional Appropriateness	Male	93	3.98*	.33	–.30
	Female	208	4.12*	.34	–.51
TEIS Recognizing Emotions in Others	Male	93	3.72	.48	–.23
	Female	208	3.70	.50	–.23
TMMS Repair	Male	47	3.60	.66	–.12
	Female	97	3.53	.80	–.27
TEIS Regulate Emotions in the Self	Male	47	3.42*	.71	–.13
	Female	97	3.02*	.73	.03
TEIS Regulate Emotions in Others	Male	47	3.66	.47	–.61
	Female	97	3.54	.59	–.27

* $p < .01$.

Table 8 con't

Measure	Sex	Sample Size	Mean	Standard Deviation	Skewness
TMMS Attention	Male	42	3.70*	.49	.08
	Female	72	3.93*	.46	–.14
TEIS Flexible Planning	Male	42	2.96*	.52	.27
	Female	72	3.25*	.54	.20
TEIS Empathy	Male	42	3.44*	.61	–.46
	Female	72	3.88*	.54	–.15
IRI Empathic Concern	Male	42	3.66*	.64	–.22
	Female	72	4.00*	.54	.02
QSE Positive Sharing	Male	42	4.14	.48	–.37
	Female	72	4.21	.53	–.42
Negative Expressivity	Male	42	3.18	.63	.04
	Female	72	3.27	.67	.15
Positive Expressivity	Male	42	3.54	.65	–.58
	Female	72	3.80	.67	–.19
Personality Facets					
N1 Anxiety	Male	42	2.69*	.86	.55
	Female	72	3.36*	.69	–.51
N2 Anger	Male	42	2.58	.91	.55
	Female	72	2.81	.78	–.10
N3 Depression	Male	42	2.22	.79	1.00
	Female	72	2.56	.81	.43
N5 Immoderation	Male	42	2.91	.59	–.15
	Female	72	3.06	.72	.25
N6 Vulnerability	Male	42	2.28*	.81	.87
	Female	72	2.82*	.64	.07

* $p < .01$.

Table 8 con't

Measure	Sex	Sample Size	Mean	Standard Deviation	Skewness
E1	Male	42	3.78	.79	–1.26
Friendliness	Female	72	3.64	.89	–.63
E2	Male	42	3.56	.86	–1.23
Gregariousness	Female	72	3.29	.89	–.17
E3	Male	42	3.51*	.54	–.31
Assertiveness	Female	72	3.08*	.74	.13
E6	Male	42	3.69	.64	–.60
Cheerfulness	Female	72	3.69	.56	.17
O1	Male	42	3.65	.63	–.00
Imagination	Female	72	3.82	.60	–.13
O2	Male	42	3.69*	.66	–1.04
Artistic Interest	Female	72	4.18*	.55	–1.11
O3	Male	42	3.52*	.55	–.34
Emotionality	Female	72	3.82*	.60	–.08
O4	Male	42	3.59	.61	–.60
Adventurousness	Female	72	3.51	.58	–.07
O5	Male	42	3.60	.74	.01
Intellect	Female	72	3.33	.75	–.00
A2	Male	42	3.46*	.65	–.19
Morality	Female	72	3.91*	.53	–.43
A3	Male	42	3.93	.66	–1.21
Altruism	Female	72	4.17	.57	–1.02
A4	Male	42	3.36*	.55	–.16
Cooperation	Female	72	3.75*	.66	–.39
A6	Male	42	3.50*	.67	–.57
Sympathy	Female	72	3.90*	.57	–.30

* $p < .01$.

Table 8 con't

Measure	Sex	Sample Size	Mean	Standard Deviation	Skewness
C1	Male	42	3.83	.50	–.11
Self-Efficacy	Female	72	3.81	.52	–.13
C3	Male	42	3.89	.52	–.38
Dutifulness	Female	72	4.05	.52	–.25
C4	Male	42	3.60	.69	–.80
Achievement-Striving	Female	72	3.69	.68	–.25
C5	Male	42	2.90	.83	–.02
Self-Discipline	Female	72	2.96	.90	.38
C6	Male	42	3.18	.46	–.07
Cautiousness	Female	72	3.34	.61	–.01
Socially Desirable Responding					
Impression Management	Male	47	.27	.17	1.05
	Female	96	.33	.18	.37
Self-Deceptive Enhancement	Male	47	.14	.14	1.44
	Female	96	.13	.13	1.07

* $p < .01$.

Note. Means were compared for men and women using one-way ANOVA's. Asterisks next to the means indicate that they were significantly different. The variances for men and women were compared using the Bartlett-Box F-test (Box, 1953). When the variances were significantly different, this is indicated in the table with asterisks next to the standard deviations. These means and standard deviations and the significance of their differences are provided for descriptive purposes only. To prevent escalating Type 1 error rates, significance is only reported if $p < .01$. Even so, with 122 comparisons being made here, 1 or 2 of these comparisons were probably significant by chance alone. See pages 32 – 37 for the rationale for the Type 1 error rate used.

Table 9
Internal Consistencies of the Cognitive Measures in the UBC Student Sample

Measure	Internal Consistency
Verbal Ability	
Advanced Vocabulary Test I	.55
Inventive Opposites	.69
Reading I	.60
Composite	*.80*
Verbal Closure	
Rearranged Words	.80
Hidden Words	.80
Incomplete Words	.48
Composite	*.82*
Visualization	
Form Board	.46
Paper Folding	.71
Surface Development	.73
Composite	*.81*
Inductive Reasoning	
Letter Sets	.63
Figure Classification	.34
Number Series	.66
Composite	*.72*

Note. Shortened versions were used for most of these tests. See Appendix C.

Composite scores were formed for each of the types of intelligence by taking the mean z-score of the three tests designed to measure it. The reliabilities of these composites were calculated using standard theorems on the reliability of linear combinations (Horst, 1966, pp. 280-282). As would be expected, the reliabilities of the composites were somewhat higher, on average, than the reliabilities of the individual tests, and fortunately this brought the internal consistencies of the composites within the acceptable range. Most subsequent analyses used only the four composite scores, not the individual tests. The one exception is the factor analysis of the 12 intelligence tests and the 24 measures of cognitive subcomponents of ESI, reported in Chapter 4, used to examine the relation of cognitive aspects of ESI to the hierarchical structure of cognitive abilities.

Personality Domain

The internal consistencies of the 23 IPIP personality scales are given in Table 10. Composite scores for each dimension were calculated as the mean z-score of the four or five facets that were measured. The reliabilities of these composites were calculated using standard formulas, and are also given in Table 10. The internal consistencies of each of the five domains were good, ranging from .90 to .94.

Measures of Socially Desirable Responding

The Impression Management subscale of the PDS: BIDR-7 had an internal consistency of .73. The Self-Deceptive Enhancement subscale had an internal consistency of .70. Both of these are considered acceptable.

Emotional and Social Intelligence Domain

The internal consistencies of the 31 ESI measures are given in Table 11. Although the majority of these measures had acceptable levels of internal consistency, many did not. Measures with unacceptably low internal consistencies include the MSCEIT L Analogies test (.37), TEIS Emotional Appropriateness subscale (.36), the OGSI Expression Grouping test (.31), and the OGSI Cartoon Predictions Test (.44). Others would be considered low, but possibly still useful. These include several MSCEIT subtests—C Blends, D Progressions, and H Transitions—as well as the 5-item version of the Levels of Emotional Awareness Scale, the OGSI Missing Cartoons test, and the OGSI Social Translations test. In fairness to the O'Sullivan and Guilford tests (Expression Grouping, Cartoon Predictions, Missing Cartoons, and Social Translations), each of these tests does have two parts and I elected to use only one part of each of these tests. The Levels of Emotional Awareness Scale as well is usually administered with either 10 or 20 items, and thus would usually have higher internal consistency. On the other hand, all available items were used for the MSCEIT subtests and the TEIS Emotional Appropriateness subscale, and therefore it appears that these tests require revision to bring their internal consistencies within the acceptable range. Since this data was collected, some revisions to the MSCEIT subscales have already been made to improve the internal consistencies (Peter Salovey, personal communication, 2000).

The low internal consistencies of these tests place limits on the magnitude of their intercorrelations with other tests (such as measures of intelligence, personality, and Socially Desirable Responding). Therefore, correlations that have been corrected for a lack of internal consistency were calculated in subsequent chapters, to estimate the strength of the relations among these concepts.

Table 10
Internal Consistencies of the IPIP Measures of the 30 NEO-PI-R Constructs in the UBC Student Sample

Facet	Coefficient Alpha of 10-item scale in Goldberg (1999a)	Coefficient Alpha of 8-item scale in this study
N1: Anxiety	.83	.84
N2: Anger	.88	.89
N3: Depression	.88	.89
N4: Self-consciousness	.80	—
N5: Immoderation	.77	.68
N6: Vulnerability	.82	.84
Composite		*.94*
E1: Friendliness	.87	.91
E2: Gregariousness	.79	.87
E3: Assertiveness	.84	.79
E4: Activity level	.71	—
E5: Excitement-Seeking	.78	—
E6: Cheerfulness	.81	.77
Composite		*.94*
O1: Imagination	.83	.78
O2: Artistic Interest	.84	.76
O3: Emotionality	.81	.69
O4: Adventurousness	.77	.76
O5: Intellect	.86	.82
O6: Liberalism	.86	—
Composite		*.90*
A1: Trust	.82	
A2: Morality	.75	.74
A3: Altruism	.77	.82
A4: Cooperation	.73	.70
A5: Modesty	.77	—
A6: Sympathy	.75	.76
Composite		*.91*
C1: Self-efficacy	.78	.71
C2: Orderliness	.82	—
C3: Dutifulness	.71	.68
C4: Achievement-striving	.78	.82
C5: Self-discipline	.85	.88
C6: Cautiousness	.76	.64
Composite		*.91*

Note. Not all facet scales were used in this study. Facets that were omitted are indicated by a dash in the second column.

Table 11
Internal Consistencies of ESI Measures in the UBC Student Sample

Category	Type of Measure[a]	Measures and Subscales	Internal Consistency[b]
Emotional Understanding	MP consensus	MSCEIT C blends	.58
		MSCEIT D progressions	.50
		MSCEIT H transitions	.57
		MSCEIT L analogies	.37
	MP open-ended	Levels of Emotional Awareness 5-item version	.59
	MP-SR hybrid	TEIS emotional appropriateness	.36
	SR	TAS-20 difficulty describing feelings	.83
		TAS-20 difficulty identifying feelings	.82
Emotional Integration	MP consensus	MSCEIT B synesthesia	.80
		MSCEIT G facilitation	.82
		MSCEIT K sensation translation	.74
Recognizing Emotions in Others	MP consensus	MSCEIT A faces	.79
	MP mult-choice	OGSI expression grouping	.31
	SR	TEIS recognition of emotion in others	.80
Perception of Emotions in Objects	MP consensus	MSCEIT F landscapes	.85
		MSCEIT J designs	.82
Social Insight	MP mult-choice	OGSI cartoon predictions	.44
		OGSI missing cartoons	.55
		OGSI social translations	.64
Managing Emotions in Self	MP consensus	MSCEIT I emotion management	.81
	SR	TMMS repair	.81
		TEIS regulation of emotion in the self	.87
Managing Emotions in Others	MP consensus	MSCEIT E emotions in relationships	.78
	SR	TEIS regulation of emotion in others	.82

Table 11 con't

Category	Type of Measure	Measures and Subscales	Internal Consistency
Positive Expressivity	SR	Positive Expressivity Scale	.79
Negative Expressivity	SR	Negative Expressivity Scale	.74
Attending to Emotions	SR	TMMS attention	.82
Emotion-Based Decision-Making	SR	TEIS flexible planning	.83
Responsive Joy	SR	QSE positive sharing	.79
Responsive Distress	SR	TEIS empathy	.87
Empathic Concern	SR	IRI empathic concern	.78

a. MP = Maximum-performance; SR = Self-Report.
b. These are the internal consistencies obtained in this study, for all measures except the MSCEIT subscales. For those measures, item-level scores are not available to test users, and so internal consistencies cannot be calculated. The internal consistencies reported here were obtained from J. D. Mayer (personal communication, July 2000).

One test—the Levels of Emotional Awareness Scale (Lane et al., 1990)—consists of open-ended questions, and is scored according to scoring manual guidelines. Usually, each protocol would be scored by a single scorer. In this study, each protocol was independently scored by two research assistants and disagreements were resolved, to improve the reliability of ratings. The inter-rater reliability of this entire procedure was assessed using a subsample of 40 participants, by comparing the scores given by one pair of markers with the scores given by another pair of markers. The average correlation among the three different pairs of markers was .96.

Data Analysis

I used 24 measures to assess the seven cognitive subcomponents of ESI. A factor analysis of these 24 measures was conducted to determine the number and nature of the underlying dimensions. A second-order factor analysis was then conducted, to determine if the first-order factors form a coherent higher-order construct.

There were two sets of cognitive ESI variables. The first set was administered to all subjects and consisted of the measures of (a) Emotional Understanding, (b) Emotional Integration, (c) Recognizing Emotions in Others, and (d) Perception of Emotions in Objects. These measures were listed in Table 3. 93 men and 210 women (and 6 people who did not specify their sex) completed these measures and survived data screening. The second set, consisting of the measures of (e) Social Insight, (f) Managing Emotions in the Self, and (g) Managing Emotions in Others, was only administered to some subjects: the subjects from the upper-level psychology class, and those who took part in the follow-up to the Subject Pool Study. These measures were listed in Table 4. A total of 47 men and 96 women (and 1 person who did not specify their sex) completed these additional measures and survived data screening. Thus, the first set of variables had a sample size of 309 subjects, while the second set had a sample size of 144.

Because different numbers of subjects completed the measures in Set 1 and Set 2, a combined factor analysis of these variables could have been done in two ways. First, I could have used only those subjects who had complete data on every variable. This would have ensured a grammian correlation matrix. A grammian correlation matrix is necessary for common-factor analysis. Second, I could have calculated each correlation based upon all available data. If this resulted in a grammian matrix, this would be the preferred solution, because the larger sample sizes for many of the correlations make the results more stable. In this data set, the second approach did result in a grammian matrix, and was therefore used.

Details of the Factor Analysis

Common-factor analysis using the method of Unweighted Least Squares (Harman, 1976) was used for all analyses. Three rules were used to determine the number of factors. First, the scree plot (Cattell, 1966) was examined. Second, the number of eigenvalues greater than 1 was counted, as recommended by Kaiser (1960). Finally, the maximum-likelihood significance test (Lawley, 1940, 1942) was used. The resulting principal factors were transformed to oblique simple structure using the orthoblique procedure of Harris and Kaiser (1964). Three values of the obliquity-controlling parameter, c, were used (0, .25, and .50), and the resulting factor pattern matrices were examined to determine how closely they approximated the ideals of simple structure. Factor pattern coefficients were examined to determine if they were salient (absolute value greater than or equal to .25), hyperplanar (absolute value less than .10), or neither. Ideally, each variable would have one salient

coefficient and all remaining coefficients would be hyperplanar. Therefore, the number of variables with salient coefficients for more than one factor (referred to as complex variables) as well as the number of hyperplane coefficients was determined. Correlations between the factors were also examined to ensure that factors were not collinear.

Many of the analyses conducted in this dissertation involve Factor Analysis. For the reader who is not familiar with factor analysis, an introduction to the topic is provided in Appendix E.

Testing Assumptions: Determining if the Men and Women Should be Analyzed Together

Data were collected from both men and women. Usually, data from two distinct subgroups (such as men and women) would be analyzed in a single factor analysis only if two conditions were met: first, there are no mean-differences between the two groups (or mean-differences have been eliminated through zero-centering); and second, the variance-covariance matrices of the two groups are the same.

Mean Differences

Mean differences between men and women were examined using Hotelling's (1931) T^2 procedure. Men and women had different mean values on the 24 variables ($T^2 = .38$, $F(24, 109) = 1.719$, $p < .05$). Therefore, these variables would need to be mean-deviated within sex before being combined.

Differences in the Variance-Covariance Matrices

Differences in the variance-covariance matrices were examined using Box's M (1949). These two variance-covariance matrices were not equal ($M = 445.05$, Chi-Square$(300) = 348.83$, $p < .05$). Therefore, ideally, separate factor analyses would have been undertaken for men and women. However, this was not possible in this data set, due to an insufficient number of men: if a separate analysis had been conducted for the men, some variables would have had as few as 46 subjects. Therefore, a combined analysis was undertaken.

Number of Factors and Transformation

The correlations among the 24 variables from Set 1 and Set 2 are given in Table 12. The sample sizes varied from 141 to 303, for a subject to variable ratio of between 6:1 and 13:1, which is in the acceptable range for a factor analysis.

Three criteria were used to determine the number of factors. The Kaiser-Guttman rule suggested 7 factors. The scree plot was not very clear, suggesting 6 or 7 factors. The maximum likelihood significance test suggested that only four factors were needed to reproduce the observed correlations (Chi-Square $(186) = 212.96$, $p > .05$). Given these conflicting results, both the four- and seven- factor solutions were examined.

For both, the Harris-Kaiser transformation with $c = .50$ resulted in the pattern matrix that came closest to simple structure. For the four-factor solution, this pattern matrix had 2 complex variables and 48% of the coefficients fell on the hyperplane. The seven-factor pattern matrix had 1 complex variable and 54% of the coefficients fell on the hyperplane.

Table 12
Correlations Among the 24 ESI Variables in Set 1 and Set 2, for Men and Women Combined

	MSCEIT A	MSCEIT B	MSCEIT C	MSCEIT D	MSCEIT F	MSCEIT G
MSCEIT A	1.0000					
	(302)					
MSCEIT B	.2468*	1.0000				
	(302)	(302)				
MSCEIT C	.1899*	.1256	1.0000			
	(302)	(302)	(302)			
MSCEIT D	.1328	.1265	.3459*	1.0000		
	(302)	(302)	(302)	(302)		
MSCEIT F	.3359*	.3254*	.1534*	.2370*	1.0000	
	(300)	(300)	(300)	(300)	(300)	
MSCEIT G	.1938*	.2786*	.0728	.1214	.3621*	1.0000
	(300)	(300)	(300)	(300)	(300)	(300)
MSCEIT H	.1660*	.0754	.3408*	.2969*	.1848*	.1191
	(300)	(300)	(300)	(300)	(300)	(300)
MSCEIT J	.1869*	.3160*	.1287	.1575*	.4311*	.2842*
	(301)	(301)	(301)	(301)	(300)	(300)
MSCEIT K	.3015*	.2677*	.1752*	.1221	.2652*	.3404*
	(296)	(296)	(296)	(296)	(296)	(296)
MSCEIT L	.0106	−.0636	.1237	.1378	.0515	−.0035
	(293)	(293)	(293)	(293)	(293)	(293)
LEAS	.1574*	.0005	.1933*	.1608*	.0501	.0517
	(302)	(302)	(302)	(302)	(300)	(300)
DDF	−.0919	−.1094	−.0793	−.0561	−.0758	−.1005
	(300)	(300)	(300)	(300)	(298)	(298)
DIF	−.1141	−.2334*	−.2138*	−.1475	−.1999*	−.1947*
	(300)	(300)	(300)	(300)	(298)	(298)
Emotional	.1225	.1404	.1726*	.0702	.0853	.0200
Appropriat.	(300)	(300)	(300)	(300)	(298)	(298)
Expression	.1601*	.0530	.1344	.0747	.1129	.0555
Grouping	(301)	(301)	(301)	(301)	(299)	(299)
Recognize	.0922	.0671	.0875	.0136	.1212	.1516*
Others	(300)	(300)	(300)	(300)	(298)	(298)
MSCEIT E	.1544	.1121	.1822	.2449*	.1047	.0851
	(143)	(143)	(143)	(143)	(142)	(142)
MSCEIT I	.2031	.1360	.0998	.1277	.0848	.1860
	(141)	(141)	(141)	(141)	(141)	(141)
Cartoon	.0867	.0095	.1322	.0338	.1194	.0930
Predictions	(142)	(142)	(142)	(142)	(141)	(141)
Missing	.0428	.0531	.2319*	.1935	−.0171	.0443
Cartoons	(142)	(142)	(142)	(142)	(141)	(141)
Social	.1557	.0638	.2310*	.2021	.0027	−.0160
Translations	(141)	(141)	(141)	(141)	(140)	(140)
TMMS	.0233	−.0308	.1146	.1253	−.0816	.1193
Repair	(144)	(144)	(144)	(144)	(143)	(143)
Regulate	.0588	−.0358	.0994	.1275	−.0816	.0143
Self	(144)	(144)	(144)	(144)	(143)	(143)
Regulate	.0958	.0570	.0519	.1516	.0189	.1476
Others	(144)	(144)	(144)	(144)	(143)	(143)

* $p < .01$.

Table 12 con't

	MSCEIT H	MSCEIT J	MSCEIT K	MSCEIT L	LEAS	DDF
MSCEIT H	1.0000					
	(300)					
MSCEIT J	.2489*	1.0000				
	(300)	(301)				
MSCEIT K	.1974*	.3620*	1.0000			
	(296)	(296)	(296)			
MSCEIT L	.1473	.0870	.0629	1.0000		
	(293)	(293)	(293)	(293)		
LEAS	.1350	.0312	.0423	.1013	1.0000	
	(300)	(301)	(296)	(293)	(303)	
DDF	.0120	.0166	−.0793	.0536	−.0739	1.0000
	(298)	(299)	(294)	(291)	(301)	(301)
DIF	−.2240*	−.1471	−.1416	.0612	−.0162	.5309*
	(298)	(299)	(294)	(291)	(301)	(301)
Emotional	.0034	.1198	.1077	.0100	.0384	−.0760
Appropriateness	(298)	(299)	(294)	(291)	(301)	(301)
Expression	.0821	.1136	.1527*	.0407	.1415	−.0496
Grouping	(299)	(300)	(295)	(292)	(302)	(300)
Recognize	.1016	.0261	.0501	.0127	.1357	−.2810*
Others	(298)	(299)	(294)	(291)	(301)	(301)
MSCEIT E	.1639	.0563	.2113	.1568	.1843	−.0995
	(142)	(142)	(139)	(137)	(143)	(143)
MSCEIT I	.0402	.2722*	.2753*	.0780	.1791	−.0898
	(141)	(141)	(139)	(137)	(141)	(141)
Cartoon	.0063	.1165	.1089	.0184	.0646	.0543
Predictions	(141)	(141)	(138)	(136)	(142)	(142)
Missing	.1983	.0464	.0920	.2274*	.2025	.0304
Cartoons	(141)	(141)	(138)	(136)	(142)	(142)
Social	.2711*	.0223	.1268	.0853	.1188	−.1454
Translations	(140)	(140)	(137)	(135)	(141)	(141)
TMMS	.0719	−.0949	.1111	.0738	.1206	−.3301*
Repair	(143)	(143)	(140)	(138)	(144)	(144)
Regulate	.0482	−.0808	.0665	.1729	.0955	−.2295*
Self	(143)	(143)	(140)	(138)	(144)	(144)
Regulate	.1662	−.0300	−.0459	.0067	.1664	−.4211*
Others	(143)	(143)	(140)	(138)	(144)	(144)

* $p < .01$.

Table 12 con't

	DIF	EM AP	EX GR	REC O	MSCEIT E	MSCEIT I
DIF	1.0000					
	(301)					
Emotional	−.0788	1.0000				
Appropriateness	(301)	(301)				
Expression	−.0743	.0512	1.0000			
Grouping	(300)	(300)	(302)			
Recognize	−.1775*	−.1159	.0041	1.0000		
Others	(301)	(301)	(300)	(301)		
MSCEIT E	−.0145	−.1196	.1374	.1500	1.0000	
	(143)	(143)	(143)	(143)	(143)	
MSCEIT I	−.0710	.0326	−.1456	.2205*	.2305*	1.0000
	(141)	(141)	(141)	(141)	(141)	(141)
Cartoon	.1278	.0132	.2303*	.0533	.1071	.0520
Predictions	(142)	(142)	(142)	(142)	(142)	(140)
Missing	.0883	−.0131	.1339	.1498	−.0262	−.1068
Cartoons	(142)	(142)	(142)	(142)	(142)	(140)
Social	−.1943	−.0926	.1648	.0991	.0750	.0557
Translations	(141)	(141)	(141)	(141)	(141)	(139)
TMMS	−.3451*	−.1437	.1637	.3866*	.2113	.0860
Repair	(144)	(144)	(144)	(144)	(142)	(140)
Regulate	−.4091*	−.2960*	.1155	.2589*	.0797	.0106
Self	(144)	(144)	(144)	(144)	(142)	(140)
Regulate	−.3339*	−.0977	−.0721	.6380*	.1523	.1727
Others	(144)	(144)	(144)	(144)	(142)	(140)

	CAR PR	MS CAR	SOC TR	Repair	REG S	TREG O
Cartoon	1.0000					
Predictions	(142)					
Missing	.3159*	1.0000				
Cartoons	(142)	(142)				
Social	.2053	.2901*	1.0000			
Translations	(141)	(141)	(141)			
TMMS	−.0024	.0487	.0934	1.0000		
Repair	(141)	(141)	(140)	(144)		
Regulate	−.0473	.0436	.1058	.6667*	1.0000	
Self	(141)	(141)	(140)	(144)	(144)	
Regulate	.0108	.0859	.0717	.3875*	.2681*	1.0000
Others	(141)	(141)	(140)	(144)	(144)	(144)

* $p < .01$.

Note. Sample sizes are given in parentheses. To prevent excessive numbers of Type 1 errors, each significance test in the above table used a Type 1 error rate of .01. Nonetheless, because 276 tests were used, approximately 3 of these tests can be expected to be significant by chance alone. See pages 31 – 36 for the rationale for the Type 1 error rate used.

LEAS = Levels of Emotional Awareness Scale. DDF = TAS-20 Difficulty Describing Feelings. DIF = TAS-20 Difficulty Identifying Feeling scale. EM AP = TEIS Emotional Appropriateness. EX GR = Expression Grouping. REC O = TEIS Recognition of Emotion in Others. CAR PR = Cartoon Predictions. MS CAR = Missing Cartoons. SOC TR = Social Translations. REG S = TEIS Regulation of Emotion in the Self. REG O = Regulation of Emotion in Others.

A second-order factor analysis was used to determine if the four first-order factors formed a coherent construct. There were two eigenvalues greater than 1, suggesting two factors. However, one of these values was very close to 1 (1.04). The scree plot could be interpreted as suggesting either 1 or 2 factors. The maximum-likelihood significance test indicated that only one factor was needed to reproduce the correlations among the first-order factors (Chi-square(2) = 3.18, $p > .10$). Therefore, only one factor was extracted.

Results

First-Order Factor Analysis of Men and Women

The four-factor and seven-factor solutions were both examined. See Table 13 for the four-factor solution, and Table 14 for the seven-factor solution.

Interpretation

Four-Factor Solution

The first factor had salient pattern coefficients from the six MSCEIT subscales designed to measure Emotion Perception and Emotion Integration. In addition, slightly lower coefficients were obtained for the MSCEIT I Emotion Management subscale and the TEIS Emotional Appropriateness subscale. The TAS-20 Difficulty Identifying Feelings subscale came very close to reaching salience on this factor as well (loading = –.24). Detailed descriptions of the scales with salient pattern coefficients for this factor are given in Table 15.

This factor might be interpreted as a method factor, because 7 of the 8 salient pattern coefficients for this factor came from the MSCEIT. However, a substantive interpretation is also possible. It makes some sense that Emotion Perception and Emotional Integration would load on the same factor: if one rates anger as being related to red (Emotional Integration), then a red landscape or design would also be interpreted as containing more anger (Emotion Perception). The inclusion of the Emotional Appropriateness subscale on this factor is also interpretable. The Emotional Appropriateness subscale was designed to measure people's ability to differentiate between similarly experienced emotions, and therefore I classified it as a measure of Emotional Understanding. However, each item assesses knowledge of the relations between situations and emotions. This scale can therefore be seen as a measure of one's accuracy in perceiving the affective content of situations, which would make it more similar to measures of Perception of Emotions in Objects. As well, the fact that the TAS-20 Difficulty Identifying Feelings subscale came close to reaching salience on this factor is interpretable. If people do not know how emotions are related to other physical sensations (Emotional Integration) then they may have difficulty interpreting the physiological aspects of emotions and identifying which emotions they are feeling. Because non-MSCEIT scales had salient pattern coefficients or near-salient coefficients for this factor, because the majority of these coefficients could be given a coherent substantive interpretation, and because many MSCEIT subscales did not load on this factor, a substantive interpretation was considered justified.

Table 13
Primary-Factor Pattern Matrix with Four Factors, for ESI Variables from Set 1 and Set 2, along with the Correlations Among the Primary Factors, for Men and Women Combined

	Primary Factor				
Measure	**1**	**2**	**3**	**4**	h^2
MSCEIT F Landscapes	**.62**	–.01	.05	–.02	.39
MSCEIT J Designs	**.61**	.06	.08	–.05	.39
MSCEIT B Synesthesia	**.51**	–.09	–.01	–.03	.27
MSCEIT G Facilitation	**.49**	–.04	–.02	.15	.27
MSCEIT K Sensation Translation	**.48**	–.01	.18	.03	.30
MSCEIT A Faces	**.40**	–.01	.17	.07	.22
MSCEIT I Emotion Management	**.36**	.08	–.04	**.32**	.22
TEIS Emotional Appropriateness	**.25**	–.01	–.01	–.23	.11
DIF	–.24	**.94**	–.01	.15	.93
DDF	–.10	**.50**	.06	–.19	.34
TEIS Regulation of Emotion in the Self	–.24	**–.48**	.21	**.25**	.45
TMMS Repair	–.18	**–.44**	.18	**.41**	.52
OGSI Missing Cartoons	–.09	.15	**.54**	.08	.31
MSCEIT C Blends	.15	–.11	**.50**	–.06	.32
OGSI Social Translations	–.03	–.11	**.46**	–.01	.23
MSCEIT D Progressions	.17	–.08	**.40**	.02	.23
MSCEIT H Transitions	.18	–.09	**.41**	–.01	.25
OGSI Expression Grouping	.04	–.06	**.33**	–.08	.12
OGSI Cartoon Predictions	.07	.21	**.31**	.08	.14
MSCEIT L Analogies	–.04	.08	**.31**	.06	.10
LEAS	.03	.05	**.29**	.20	.14
TEIS Recognition of Emotion in Others	.08	–.09	–.01	**.70**	.54
TEIS Regulation of Emotion in Others	.03	**–.25**	–.04	**.64**	.56
MSCEIT E Emotions in Relationships	.15	.04	.22	**.26**	.16

	Primary Factor			
Primary Factor	**1**	**2**	**3**	**4**
1	1.00	–.08	.17	.04
2	–.08	1.00	–.09	–.24
3	.17	–.09	1.00	.14
4	.04	–.24	.14	1.00

h^2 = Communality. DIF = TAS-20 Difficulty Identifying Feeling. DDF = TAS-20 Difficulty Describing Feelings. LEAS = Levels of Emotional Awareness Scale.

Table 14

Primary-Factor Pattern Matrix with Seven Factor Solution for ESI Variables from Set 1 and Set 2, along with the Correlations among the Primary Factors, for Men and Women Combined

	Primary Factor							
Measure	**1**	**2**	**3**	**4**	**5**	**6**	**7**	h^2
Regulate Self	**.90**	−.02	.10	−.01	−.07	−.01	−.03	.86
TMMS Repair	**.62**	−.07	−.01	.16	−.20	.10	.17	.62
Emot. Appropriat.	**−.35**	.08	.05	−.14	**−.25**	.04	.05	.19
MSCEIT J	−.05	**.64**	.13	−.03	.10	−.04	−.01	.44
MSCEIT F	−.08	**.62**	.08	.02	−.02	.01	−.02	.42
MSCEIT G	.06	**.55**	−.06	.13	.00	.03	.02	.32
MSCEIT K	.10	**.49**	.03	−.13	−.02	.12	.22	.38
MSCEIT B	−.09	**.47**	.01	.01	−.15	.02	.01	.27
MSCEIT A	−.04	**.32**	.07	−.02	−.11	.13	.22	.24
MSCEIT H	.00	.15	**.58**	.07	.04	−.05	−.04	.38
MSCEIT C	−.06	.02	**.50**	−.07	−.15	.14	.14	.38
MSCEIT D	.02	.08	**.50**	−.01	−.02	−.02	.14	.31
Social Translations	.02	−.05	**.31**	.03	−.12	**.29**	−.00	.24
MSCEIT L	.15	−.01	**.28**	−.02	.21	.02	.08	.15
Regulate Other	.06	−.03	.09	**.80**	−.19	−.07	.07	.79
REC OTH	.15	.10	−.05	**.67**	−.02	.08	.09	.56
DIF	−.22	−.22	−.22	−.03	**.71**	.15	.19	.83
DDF	−.05	.01	.06	−.22	**.60**	−.06	−.08	.48
Missing Cartoons	−.02	−.02	**.34**	.21	.20	**.51**	−.21	.53
Cartoon Predictions	−.06	.11	−.06	.06	.10	**.51**	.05	.30
Expression Group.	.13	.09	−.01	−.19	−.13	**.44**	.06	.27
MSCEIT E	.10	.02	.13	.01	.03	.03	**.49**	.31
MSCEIT I	−.03	.22	.02	.15	.04	−.16	**.45**	.34
LEAS	−.01	−.07	.20	.10	−.01	.15	**.26**	.17

	Primary Factor						
Primary Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	1.00	−.05	.09	.19	−.20	.04	.09
2	−.05	1.00	.18	.02	−.14	.07	.20
3	.09	.18	1.00	.08	−.10	.23	.15
4	.19	.02	.08	1.00	−.18	.03	.14
5	−.20	−.14	−.10	−.18	1.00	.06	−.02
6	.04	.07	.23	.03	.06	1.00	.06
7	.09	.20	.15	.14	−.02	.06	1.00

h^2 = Communality. REC OTH = TEIS Recognition of Emotion in Others. DIF = TAS-20 Difficulty Identifying Feeling. DDF = TAS-20 Difficulty Describing Feelings. LEAS = Levels of Emotional Awareness Scale. Regulate Self = TEIS Regulation of Emotion in the Self. Regulate Other = TEIS Regulation of Emotions in Others.

Table 15
Description of the Scales Loading on Factor 1 (Emotion Perception) in the Four-Factor Solution of the 24 ESI Variables

Scale	Subscale	Description	Loading
Emotion Perception			
MSCEIT	Section F Landscapes	Five landscape pictures are rated on each of seven emotions (*happiness, sadness, fear, anger, surprise, disgust,* and *excitement*) using a five-point scale.	.62
MSCEIT	Section J Designs	Five graphic designs are rated on each of the seven emotions, using the five-point scale.	.61
MSCEIT	Section A Faces	Five faces chosen to represent a variety of emotions are each rated on the seven emotions using a five point scale.	.40
Emotion Integration			
MSCEIT	Section B Synesthesia	For each of five items, subjects are asked to rate the similarity of a given emotion to five other sensations, including warmth, touch, and color. Each sensation is rated from 1 "Not Alike" to 5 "Very Much Alike."	.51
MSCEIT	Section G Facilitation	For each of seven situations, subjects are asked to rate each of five emotions (different for each situation) for their helpfulness. Each emotion is rated on a five-point scale where 1 represents "Definitely Not Useful" and 5 represents "Definitely Useful."	.49
MSCEIT	Section K Sensation Translation	Five complex physical sensations are rated in terms of their similarity to five emotions (different for each item) using a five-point scale where 1 represents "Not Alike" and 5 represents "Very Much Alike."	.48
Management of Emotions in the Self			
MSCEIT	Section I Emotion Management	For each of six emotionally-charged situations, subjects evaluate the effectiveness of five possible actions, using a five-point rating scale where 1 represents "Very ineffective" and 5 represents "Very effective."	.36
Emotional Understanding			
TEIS	Emotional Appropriate-ness	Twelve likert-type items measure the ability to differentiate between similarly experienced emotions, e.g., fear versus anger. In each item, subjects must indicate whether a certain situation would cause a certain emotion. Example items: "Getting robbed would make me nervous." and "It would be exciting to be in a car accident." (reverse-scored). Six items are reverse-scored.	.25

I labeled this factor Emotion Perception. Seven of the eight measures that loaded on this factor deal with perception of specific named emotions in other phenomenon: the three measures of Emotion Perception deal with the perception of emotion in visually presented stimuli; two of the measures of Emotional Integration—Synesthesia and Sensation Translation—deal with perception of emotion in physical sensations; and the Facilitation subscale and the Emotional Appropriateness subscale deal with the relation of situations to emotions. The relationships involved in the Emotion Management subscale are somewhat more complicated because participants needed to recognize the relation between a situation and a given emotion, and the relation between the emotion and a number of possible behaviours.

The second factor had salient pattern coefficients for five variables. The largest loading was for the Difficulty Identifying Feelings subscale of the TAS-20 (loading = .94). The Difficulty Describing Feelings subscale also had a salient loading (loading = .50), as did the three self-report measures of emotion regulation: the TMMS Repair subscale, the TEIS Regulation of Emotion in the Self subscale, and the TEIS Regulation of Emotion in Others subscale. These latter three subscales had negative pattern coefficients. Thus, the highest scores would be obtained by people who scored high on the two TAS-20 scales and low on the three regulation subscales. These people see themselves as confused about their own emotions and unable to control either their own emotions or others'.

This factor might be interpreted as primarily a method factor because only self-report measures had salient pattern coefficients for it. However, not all of the self-report measures had salient pattern coefficients for this factor. As well, the self-report measures that did load on this factor came from three different questionnaires. Therefore, I felt justified in giving this factor a substantive interpretation.

The failure of the TEIS Recognition of Emotion in Others subscale to load on this factor is reassuring methodologically (suggesting that this is not simply a method factor), but it also complicates interpretation. I labeled this factor "Perceived Difficulty with Emotions". This label is not entirely satisfactory, however, because it suggests a salient negative loading from the Recognition of Emotion in Others subscale. Later analyses on the relation of this factor to other types of intelligence and personality dimensions were used to clarify the interpretation of this factor. Descriptions of the subscales loading on this factor are given in Table 16.

The third factor had salient pattern coefficients for the four MSCEIT subscales designed to measure Emotional Understanding, the four OGSI tests (three of which I classified as measuring Social Insight, and one of which I classified as measuring Recognition of Emotions in Others), and the Levels of Emotional Awareness Scale. This factor should not be interpreted as a simple method factor, because the different maximum-performance tests used different scoring methods: the OGSI tests are multiple-choice; the MSCEIT tests use consensus scoring; and the Levels of Emotional Awareness Scale is open-ended.

None of the tests with salient loadings on this factor involves simple perceptual processes. Instead, each requires higher-level understanding and problem-solving. I therefore labeled this factor Emotion Insight. Descriptions of the scales that loaded on this factor are given in Table 17.

Table 16
Description of the Scales Loading on Factor 2 (Perceived Difficulty with Emotions) in the Four-Factor Solution of the 24 ESI Variables

Scale	Subscale	Description	Loading
Emotional Understanding			
TAS-20	Difficulty Identifying Feelings	A 7-item likert-type scale. Two of the items are "I am often confused about what emotion I am feeling" and "I have feelings that I can't quite identify."	.94
TAS-20	Difficulty Describing Feelings	A 5-item likert-type scale. Two of the items are "It is difficult for me to find the right words for my feelings" and "I find it hard t describe how I feel about people." One item is reverse-scored.	.50
Regulation of Emotion in the Self			
TEIS	Regulation of Emotion in the Self	A 12-item likert-type scale of the ability to control one's feelings. Two example items are "I can keep myself calm even in highly stressful situations" and "I think my biggest problem is my inability to control my emotions" (reverse-scored). Six items are reverse-scored.	–.48
TMMS	Repair	A 6-item likert-type scale of the ability to regulate one's emotions. Two example items are "Although I am sometimes sad, I have a mostly optimistic outlook" and "I try to think good thoughts no matter how badly I feel."	–.44
Regulation of Emotion in Others			
TEIS	Regulation of Emotion in Others	A 12-item likert-type scale of the ability to influence others' emotions. Two example items are "Usually, I know what it takes to turn someone else's boredom into excitement" and "I don't think I'm very good at persuading other people" (reverse-scored). Six items are reverse-scored.	–.25

Table 17
Description of the Scales Loading on Factor 3 (Emotional Insight) in the Four-Factor Solution of the 24 ESI Variables

Scale	Subscale	Description	Loading
Emotion Understanding			
MSCEIT	Section C Blends	Thirteen multiple-choice items assess the ability to analyze blended or complex emotions.	.50
MSCEIT	Section D Progressions	Twelve multiple-choice items assess understanding of how emotional reactions proceed over time, with an emphasis on intensification of feelings.	.40
MSCEIT	Section H Transitions	Twelve passages assess understanding of how emotions change as situations change. For each, two emotions are given in the item stem. The subject must choose the situation (from five alternatives) that accounts for the change in emotions.	.41
MSCEIT	Section L Analogies	For each of twelve items, an analogy between two emotions is given. Five possible emotion analogies are given as responses. Subjects choose the analogy that captures the same relation as the analogy given.	.31
Levels of Emotional Awareness Scale		Subjects report how they would feel in each of five emotionally-evocative situations. They also describe how the other person would feel. Responses are scored based on the complexity and number of emotion words used.	.29
Social Insight			
OGSI	Missing Cartoons	This test measures understanding of behaviour relationships. Each item presents a series of four cartoons that tells a story. One of these cartoons is missing, and must be selected from among a set of four alternatives.	.54
OGSI	Social Translations	This test measures the ability to recognize changes in behavioural meaning based on context. The subject is given a verbal statement that is exchanged between two people. The subject must then choose one of three alternative pairs of people between whom the same verbal statement would have a different meaning.	.46
OGSI	Cartoon Predictions	This is a test of the ability to predict behaviour consequences. For each item, a cartoon depicts an interpersonal situation. The subject must choose one of three alternative cartoons to show what is most likely to happen next.	.31
Recognition of Emotions in Others			
OGSI	Expression Grouping	This test measures the ability to abstract common attributes from behaviour or expressive stimuli. Each item consists of a group of three line drawings of facial expressions, hand gestures, and body postures that show some thought, feeling or intention. Subjects select one of four alternative drawings of expressions that belong with the given group of expressions.	.33

The fourth factor had salient pattern coefficients for six different variables: TEIS Recognition of Emotion in Others; TEIS Regulation of Emotion in Others; TMMS Repair subscale; MSCEIT E (Emotions in Relationships); MSCEIT I (Emotion Management); and TEIS Regulation of Emotion in the Self. This factor therefore included both self-report and maximum-performance measures, from scales related to emotions in both the self and in others, and from scales related to the recognition of emotion as well as the regulation of emotion. I labeled this factor "Emotional Understanding of Others and Regulation of Emotion" in an attempt to capture the range of content covered. This label was data-driven, and it not meant to imply that there is a higher-order construct that connects the concepts of Emotional Understanding of Others and Regulation of Emotion. Analyses reported in the next chapter on the relation of this factor to other types of intelligence and personality dimensions assisted in a more complete understanding of this factor. See Table 18 for descriptions of the scales loading on this factor. A short description of each of the four factors is given in Table 19.

Seven-Factor Solution

The first factor had strong pattern coefficients for TEIS Regulation of Emotions in the Self subscale (loading = .90), and TMMS Repair subscale (loading = .62), as well as a smaller loading for the TEIS Emotional Appropriateness subscale (loading = –.35). This factor was therefore labeled Self-Reported Self-Regulation. The negative loading for the Emotional Appropriateness subscale complicated interpretation of this factor. This suggests that people who have unusual emotional reactions or who have difficulty understanding their emotions believe that they are better at regulating their emotions. Given that maximum-performance measures of self-regulation did not load on this factor, it is possible that these people are mistaken about their ability to regulate their emotions.

The second factor had salient pattern coefficients for the six MSCEIT subscales designed to measure Emotion Perception and Emotion Integration. This factor was therefore labeled Emotion Perception, following the same rationale as was given for the corresponding factor in the four-factor solution.

The third factor had salient pattern coefficients for each of the four MSCEIT subscales designed to measure Emotional Understanding, as well as two of the OGSI tests that I interpreted as measuring Social Insight: Missing Cartoons and Social Translations. This factor was labeled Emotion Insight.

The fourth factor had salient pattern coefficients for the TEIS Regulation of Emotion in Others subscale and the TEIS Recognition of Emotion in Others subscale. This factor was therefore labeled Self-Reported Understanding of Others' Emotions.

The fifth factor had salient pattern coefficients for the two TAS-20 subscales as well as a small negative loading for the TEIS Emotional Appropriateness subscale. Because the loadings for the TAS-20 subscales were quite a bit larger than the loading for the TEIS subscale, this factor was interpreted as primarily a method factor for the TAS-20. It was labeled TAS Alexithymia.

The sixth factor had salient pattern coefficients from each of the four OGSI tests. This factor was labeled "O'Sullivan and Guilford Tests."

The final factor had salient pattern coefficients for the two MSCEIT subscales for Emotion Regulation as well as a smaller loading for the Levels of Emotional Awareness Scale. It was labeled Maximum-Performance Measures of Emotion Regulation.

Table 18
Description of the Scales Loading on Factor 4 (Emotional Understanding of Others and Regulation of Emotion) in the Four-Factor Solution of the 24 ESI Variables

Scale	Subscale	Description	Loading
Recognition of Emotions in Others			
TEIS	Recognition of Emotion in Others	A 12-item likert-type self-report scale of the ability to detect and understand others' feelings. Two example items are " I am good at "reading" the inner feelings of others even if I don't know them very well" and "I am often not the best judge of character" (reverse-scored). Six items are reverse-scored.	.70
Regulation of Emotions in Others			
TEIS	Regulation of Emotions in Others	A 12-item likert-type self-report measure of the ability to influence others' emotions. Two example items are "Usually, I know what it takes to turn someone else's boredom into excitement" and "I don't think I'm very good at persuading other people" (reverse-scored). Six items are reverse-scored.	.64
MSCEIT	Section E Emotions in Relationships	For each of five situations, subjects evaluate five possible courses of action, in terms of effectiveness: "Extremely Ineffective" (1) to "Extremely Effective (5).	.26
Regulation of Emotions in the Self			
TMMS	Repair	A 6-item likert-type self-report measure of the ability to regulate one's emotions to maintain a good mood. Two example items are "Although I am sometimes sad, I have a mostly optimistic outlook" and "When I become upset I remind myself of all the pleasures in life." One item is reverse-scored.	.41
MSCEIT	Section I Emotion Management	For each of six emotionally-charged situations, subjects evaluate the effectiveness of five possible actions, using a five-point rating scale where 1 represents "Very ineffective" and 5 represents "Very effective."	.32
TEIS	Regulation of Emotion in the Self	A 12-item likert-type self-report measure of the ability to control one's feelings. Two example items are "I can keep myself calm even in highly stressful situations" and "I think my biggest problem is my inability to control my emotions" (reverse-scored). Six items are reverse-scored.	.25

Table 19
Four Factors of Cognitive Subcomponents of Emotional and Social Intelligence

Factor Number	Label	Description
1	Emotion Perception	Able to identify emotions in oneself, others, and inanimate objects; understands the relations of emotions to other physical sensations and to situations.
2	Perceived Difficulty with Emotions	Self-reported difficulty identifying and describing emotions, and regulating emotions in the self and others.
3	Emotion Insight	Understands the relations among emotions, and how they change over time; able to predict how others will think, feel, and act.
4	Emotional Understanding of Others and Regulation of Emotion	Able to recognize and manage emotions in others and able to regulate own emotions.

Four of these factors, therefore, included instruments that used only a single measurement method. The three exceptions are the first factor (which included both self-report and the hybrid method—the Emotional Appropriateness subscale), the third factor (which included two different types of maximum-performance measures), and the fifth factor (which included both self-report and the hybrid method). The majority of these factors, therefore, were interpreted as method factors. Because of this, this solution will not be discussed further.

Second-Order Factor Analysis

A second-order factor analysis of the four-factor solution was conducted to determine if cognitive aspects of ESI form a coherent higher-order construct. One-factor was extracted. Table 20 contains the Pattern Matrix coefficients.

Interpretation

Three of the four first-order factors had salient pattern coefficients on the second-order factor. Examining the communalities of these variables, it is clear that the higher-order factor does not explain a large portion of the variance of these first-order factors. Returning to the correlations among the factors, given in Table 13, we again see that these factors do not have much in common with each other. It seems likely, then, that it will be more meaningful and useful to discuss and research the first-order factors and the individual measures than to focus on the higher-order domains of ESI or Emotional Intelligence.

Estimating Factor Scores

Because I wished to include scores on the four cognitive ESI factors in analyses discussed in later chapters, I needed to estimate factor scores for each subject. Although 149 participants completed the Set 1 and Set 2 cognitive ESI measures, not every subject had complete data. Scores on the four factors were therefore estimated using the Regression Method (Harman, 1976) for those 134 subjects with complete data on all these measures. The internal consistencies of these factor scores were calculated using standard theorems on the reliability of a linear combination (see Horst, 1966, pp. 280-282). These more complicated formulas were needed to calculate the internal consistencies of factor scores, because the variables were not unit-weighted: variables were weighted by the transformation matrix given by the regression method of factor score estimation. The internal consistencies were estimated as .66, .85, .68, and .66, respectively.

Conclusions

Summary

The 24 cognitive measures of ESI were subjected to an Unweighted Least Squares factor analysis with Harris-Kaiser transformation. Both the four- and the seven-factor solutions were examined. However, four of the factors from the seven-factor solution could be interpreted as method factors, and therefore the four-factor solution was preferred. The four factors were (a) Emotion Perception, (b) Perceived Difficulties with Emotions, (c) Emotion Insight, and (d) Emotional Understanding of Others and Regulation of Emotion. The correlations among these factors were quite small. One factor emerged in a higher-order factor analysis, but only three of these four first-order factors had salient pattern coefficients for this second-order factor, and the communalities of the first-order factors were low. This indicates that it may be more fruitful to focus future research and discussion at the level of factors, subcomponents, or individual measures: it does not appear that there is a single coherent construct of Emotional and Social Intelligence.

Table 20
Second-Order Factor Matrix for the 24 Cognitive ESI Variables

First-Order Factor	Factor Label	Second-Order Factor 1	h^2
1	Emotion Perception	.20	.04
2	Perceived Difficulties with Emotions	**–.43**	.19
3	Emotion Insight	**.30**	.09
4	Emotional Understanding of Others and Regulation of Emotion	**.48**	.23

h^2 = Communality.

The Relation of These Results to My Original Hypotheses

Originally, I hypothesized that I might find as many as seven factors or as few as three or four. The seven factors were (a) Emotional Understanding, (b) Emotional Integration, (c) Recognizing Emotions in Others, (d) Perception of Emotions in Objects, (e) Social Insight, (f) Managing Emotions in the Self, and (g) Managing Emotions in Others. The four factors were (a) Emotional Understanding, (b) Emotional Perception, (c) Social Insight, and (d) Managing Emotions. Although I found four factors, these were not the four factors I hypothesized. Nor did my factors correspond to a simple re-combination of my original seven cognitive subcomponents. Instead, self-report and maximum-performance measures of the same constructs loaded on different factors: this was true for Emotional Understanding, Recognition of Emotion in Others, Regulation of Emotion in Oneself, and Regulation of Emotion in Others. It therefore appears that self-report and maximum-performance measures are tapping different underlying constructs, and that this had a strong influence on my results. To gain a better understanding of the functioning of the maximum-performance and self-report measures, I examined how my obtained factors were related to my originally hypothesized seven factors (see Table 21).

First, measures of Emotional Understanding were divided between three factors: the MSCEIT subscales and the Levels of Emotional Awareness Scale loaded together (along with the four OGSI measures); the two self-report measures (Difficulty Describing Feelings and Difficulty Identifying Feelings) loaded together (with self-report measures of emotion management); and the TEIS Emotional Appropriateness subscale loaded with the Perception and Integration measures. It thus appears that knowledge of the relation between situations and emotions (Emotional Appropriateness) has more in common with Perception of Emotion in Objects than it does with understanding one's own emotions. In addition, self-report and maximum-performance measures of Emotional Understanding appear to tap different and almost unrelated constructs: scores on factor 2 (where the self-report measures loaded) had a very low correlation with scores on factor 4 (where the maximum-performance measures loaded).

Second, the three measures of Recognizing Emotions in Others loaded on three separate factors. Recognizing Emotions in Others does not appear to be a coherent construct. Method bias appears to be having a large influence here, as the MSCEIT A Faces subscale loaded with the MSCEIT measures of Perception of Emotion in Objects, while the OGSI Expression Grouping test loaded with the OGSI measures of Social Insight. These results provided no evidence for my original hypothesis that recognizing emotions in people may be different from perception of emotions in inanimate objects: the three MSCEIT subscales designed to measure Emotion Perception loaded together on a single factor.

Third, I originally noted that managing emotions could be logically divided into Managing Emotions in the Self and Managing Emotions in Others. My factor analysis results did not support that distinction: all measures of Managing Emotions loaded together on a single factor (factor 4). However, my results do support a distinction between maximum-performance measures and self-report measures of managing emotions. Each of the self-report measures and none of the maximum-performance measures had an additional salient loading on another factor (factor 2).

Table 21
Relation of Hypothesized Factors to Obtained Factors

Measures	Hypoth. 7-Factor Solution	Hypoth. 4-Factor Solution	Obt. Factor 1	Obt. Factor 2	Obt. Factor 3	Obt. Factor 4
Emotional Understanding						
MSCEIT C Blends	1	1			+	
MSCEIT D Progressions	1	1			+	
MSCEIT H Transitions	1	1			+	
MSCEIT L Analogies	1	1			+	
Levels of Emotional Awareness	1	1			+	
TAS-20 Difficulty Describing Feelings	1	1		+		
TAS-20 Difficulty Identifying Feelings	1	1		+		
TEIS Emotional Appropriateness	1	1	+			
Emotional Integration						
MSCEIT B Synesthesia	2	1	+			
MSCEIT G Facilitation	2	1	+			
MSCEIT K Sensation Translation	2	1	+			
Recognizing Emotions in Others						
MSCEIT A Faces	3	2	+			
OGSI Expression Grouping	3	2			+	
TEIS Recognition of Emotion in Others	3	2				+
Perception of Emotions in Objects						
MSCEIT F Landscapes	4	2	+			
MSCEIT J Designs	4	2	+			
Social Insight						
OGSI Cartoon Predictions	5	3			+	
OGSI Missing Cartoons	5	3			+	
OGSI Social Translations	5	3			+	
Managing Emotions in Self						
TMMS Repair	6	4		–		+
TEIS Regulation of Emotion in the Self	6	4		–		+
MSCEIT I Emotion Management	6	4	+			+
Managing Emotions in Others						
TEIS Regulation of Emotion in Others	7	4		–		+
MSCEIT E Emotions in Relationships	7	4				+

Hypoth. = Hypothesized. Obt. = Obtained.
+ positive loading. – negative loading.

The Relation of These Results to Previous Research

My factors bear little resemblance to factors that have been found using item-level factor analyses of self-report Emotional Intelligence measures, because the self-report Emotional Intelligence measures that have been examined include both cognitive and personality subcomponents of ESI. However, the factors I found do bear some resemblance to factors that were found by Davies et al. (1998) and by Mayer et al. (2000), and I will compare my factors to the factors found in each of those studies.

Davies et al. (1998) found three ESI factors, labeled Emotional Clarity, Emotional Awareness, and Emotion Perception. In my terminology, the second of these corresponds to Attending to Emotions, which was not included in my factor analysis. However, the remaining two factors are similar to factors I found. Their first factor, Emotional Clarity, had salient pattern coefficients for the TMMS Clarity subscale as well as negative pattern coefficients for the TAS-20 Difficulty Identifying Feelings and Difficulty Describing Feelings subscales. This factor therefore corresponds most closely to my Perceived Difficulties with Emotions factor (although reversed in direction). Davies' Emotional Clarity factor should not be interpreted as being similar to my Emotion Insight factor, because no maximum-performance measures of these concepts were used in their research.

The third ESI factor Davies et al. found had salient pattern coefficients from the four Emotion Perception measures they included. In my terminology, these four tests represent a combination of Recognizing Emotions in Others and Perception of Emotion in Objects. This factor therefore corresponds most closely to my Emotion Perception factor. Davies et al. did not include any measures of Emotional Integration, which may account for the difference in our factors.

Mayer et al. (2000) found three factors in their research: Perception of Emotions, Understanding of Emotions, and Managing Emotions. The first of these factors represents a combination of Recognizing Emotions in Others and Perception of Emotions in Objects, while the second of these represents a combination of Emotional Understanding and Emotional Integration. Thus, in their research, measures of Emotional Integration load on the same factor as the measures of Emotional Understanding; whereas in my research these measures loaded on the same factor as Emotional Perception measures. Our results converge, however, on the finding that Emotional Perception is distinct from Emotional Understanding.

Their third factor, Managing Emotions, is a combination of Managing Emotions in the Self and Managing Emotions in Others. As such, it is closest to my fourth factor, Emotional Understanding of Others and Regulation of Emotion. However, in addition to salient pattern coefficients for five measures (some of which were maximum-performance and some of which were self-report) of regulation of emotion in the self and others, my factor included a salient loading for a self-report measure of the ability to recognize emotions in others (TEIS Recognition of Emotion in Others): this was in fact the highest loading on this factor. No self-report measures of emotion regulation were included in the Mayer et al. (2000) study, and therefore my results do not contradict theirs. Indeed, our separate results converge on the conclusion that Managing Emotions in Others and in Oneself represent the same underlying skill.

At this point, I would like to remind the reader that differences between my results and the results of previous dimensional analyses were expected. Because the boundaries and content of ESI have not been well-defined, the subcomponents (and measures) that are

included in any particular research program are idiosyncratic. Factors that appear repeatedly are our best indication of the important dimensions in this area. At present, there is converging evidence for the following factors: Emotional Understanding, Emotional Integration, Emotion Perception, Managing Emotions, Perceived Difficulty with Emotions, and Social Insight. Not all of these dimensions may be distinct from each other, however.

The Dimensionality of Emotional and Social Intelligence

Some researchers have suggested that Emotional Intelligence may represent a single homogeneous construct (e.g., Schutte et al., 1998) or that it is tied together by a single higher-order construct (Bar-On, 1997b; Mayer et al., 2000). My results—which were based upon a wider range of constructs and a wider range of measurement methods—argue against a single higher-order factor. Previous conclusions were based upon analyses that used only a single measurement method: Schutte et al. and Bar-On both used self-report exclusively, while Mayer et al. used maximum-performance exclusively. It seems that only by limiting oneself to a single measurement method—self-report or maximum-performance—does one obtain a single higher-order factor. On the other hand, relatively strong arguments can be made for limiting oneself to single measurement methods. Bar-On (1997b) for example, designed the EQ-i to measure *non-cognitive* factors that lead to success in life: his avoidance of maximum-performance measures is therefore understandable. Mayer et al. (2000) designed the MEIS to measure a *cognitive* ability model of Emotional Intelligence: their reliance upon maximum-performance measures is therefore commendable, because maximum-performance tests are usually preferred for the measurement of cognitive abilities. Combining my results with the results of Bar-On and Mayer et al., it seems that the dimensionality of the ESI domain depends on both the measurement model selected and the subcomponents included, because different measurement methods are optimal for different types of constructs. No conclusion regarding the dimensionality of ESI can be made until researchers agree upon the subcomponents that fall within the ESI area.

The Nomological Status of the Emotional and Social Intelligence Factors

At this point, it would be premature to conclude that the first-order factors obtained here represent new types of intelligence. However, because these are dimensions that underlie responses on ESI measures, these can be considered *candidates* for new types of intelligence. Evidence regarding the relation of these factors to other cognitive abilities and to personality dimensions in the next two chapters was used to draw conclusions regarding the nomological status of these factors. These conclusions will be reported in those chapters.

CHAPTER 3: TYPES OF INTELLIGENCE VERSUS PERSONALITY DIMENSIONS

Background

As explained in the introduction, I categorized half of the ESI subcomponents as cognitive and half as personality, based on the existence of maximum-performance tests for the constructs and based on the claims made by the test developers regarding the cognitive or non-cognitive nature of the constructs they were attempting to measure. However, each of these subcomponents has been labeled as an aspect of Emotional Intelligence by at least some writers. Calling a variable a type of intelligence when it is not is problematic for two reasons. First, it will be difficult to create useful theories of the general nature of intelligence if many qualities that are not types of intelligence are studied at the same time. Some specification of the subject matter is necessary to create solvable problems in any area of research. Second, the word "intelligence" is a value-laden term: the assumption is that more is better. This assumption is true for many types of intelligence in many situations. However, this assumption is not valid for all individual difference variables. In varying situations or types of jobs, different personality characteristics, for example, might be more or less beneficial. For example, it could be that extraversion is positively related to success among salespeople, but negatively related to success among accountants or poets. Using the term "intelligence" to describe a variable that is not a type of intelligence is therefore misleading and could be damaging. We might hire someone because they had a high score on an Emotional Intelligence test, for example, and only find out later that many of the qualities that we measured were negatively related to success in this particular job.

Because of this, intelligence researchers examine many types of evidence before concluding that a construct or test measures a new type of intelligence. For example, decades of research in the area of Social Intelligence are slowly starting to indicate that at least some areas of Social Intelligence may indeed represent types of intelligence (Brown & Anthony, 1990; Ford & Tisak 1983; Frederiksen, Carlson, & Ward, 1984; Gough, 1965; Keating, 1978; Legree, 1995; Marlowe, 1986; O'Sullivan & Guilford, 1976; Riggio, 1989; Thorndike, 1936; Thorndike & Stein, 1937; Walker & Foley, 1973; Wong, Day, Maxwell, & Meara, 1995). On the other hand, many people have suggested that there might be such a thing as moral or spiritual intelligence, but Gardner (1999) concludes that there is insufficient evidence that this is a type of intelligence. In summary, intelligence researchers are quite careful in labeling a new construct a type of intelligence and evidence is needed to justify using the term "intelligence" in the ESI area.

Previous research on this topic is sparse. Only one study has directly addressed this question, and this was one of the studies by Davies et al. (1998). In each of their three factor analytic studies, they included both cognitive and personality variables. In the second study, enough personality and cognitive measures were included to clearly mark one or more personality factors as well as one or more cognitive factors. This allows us to test whether the ESI measures that they included are more closely associated with cognitive or personality dimensions.

Davies et al. (1998) included measures of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness as well as several different cognitive abilities (in their analysis, four cognitive factors emerged: Technical Knowledge, Perceptual Speed, Quantitative Ability, and Verbal Ability). Six of the seven ESI measures had salient pattern coefficients on at least one of the personality factors, and five of the ESI measures had salient

coefficients on one of the cognitive factors. This might suggest that the ESI measures tap both cognitive abilities and personality dimensions.

However, examining their results more closely, I found that each of the six self-report measures of ESI had their *highest* loading on one of the personality factors, while the one maximum-performance test of ESI had its *highest* loading on one of the cognitive factors. Thus, the TMMS Attention Subscale (which measures Attending to Emotions), the TMMS Repair subscale (which measures Managing Emotions in the Self), the TMMS Clarity subscale and the TAS-20 Difficulty Identifying Feelings Subscale (which both measure Emotional Understanding), the Balanced Emotional Empathy Scale (which appears to measure several aspects of ESI), and the Affective Communication Test (which measures Positive Expressivity and Negative Expressivity) all had their highest coefficients for one of the personality factors, while the maximum-performance Self-Awareness Test (which measures self-insight into one's motivations—a concept that falls outside the 14 subcomponents I have focussed upon) had its highest loading on one of the cognitive factors. Finding that each of the ESI measures had their highest coefficients for those factors that used the same type of measurement (e.g., self-report versus maximum-performance) is not surprising, as the use of common measurement methods often influences emerging factors. Therefore, the results of the Davies et al. factor analysis are not very illuminating. Additional research is needed to determine if other self-report measures of ESI are able to overcome this method bias, and to examine a greater number of maximum-performance measures of ESI.

Fortunately, although there were no other studies that have directly examined whether particular ESI measures tap intelligence or personality dimensions, there have been a few studies that have tried to determine if some ESI subcomponents are types of intelligence. This is because researchers of both Social Intelligence and Emotional Intelligence argue that these constructs are actual cognitive abilities. I will consider these two areas in turn.

Since the first introduction of the term in 1920, Social Intelligence has been viewed as a type of intelligence, akin to Verbal, Mechanical, or Spatial Ability. However, initial research on the independence of Social Intelligence from other forms of intelligence, particularly Verbal Ability, was disappointing: it did not appear that tests of Social Intelligence were measuring anything new. Thorndike's (1936) factor analysis found that the George Washington Social Intelligence Test (GWSIT) loaded heavily on a Verbal Ability factor. As well, Thorndike and Stein (1937) found nine studies (usually involving college students) with a median correlation of .57 between the GWSIT and various more traditional measures of intelligence. Thorndike et al. (1937) note that this correlation is attenuated due to unreliability and restriction of range, and thus must be considered unacceptably high.

More recent research has produced mixed results. Using a sample of college students, Keating (1978) found no evidence for convergent or discriminant validity of Social Intelligence: correlations among measures of Social Intelligence were no higher than correlations between measures of Social Intelligence and other forms of intelligence, and factor analysis produced no identifiable Social Intelligence factor. Similarly, Frederiksen, Carlson, & Ward (1984), using a sample of medical students, found no consistent relation among interview behaviours believed to measure Social Intelligence, nor between these interview behaviours and measures of other forms of intelligence.

On the other hand, Ford and Tisak (1983), using a sample of high school students, found that Social Intelligence measures demonstrated both convergent validity among

themselves, and discriminant validity with measures of other forms of intelligence. Brown and Anthony (1990) replicated and extended these findings using undergraduate students, showing again that Social and Academic Intelligence represent partially overlapping domains, and also showing that self-assessments of Social Intelligence bear little relation to peer-assessments. Legree (1995), using U.S. Air Force recruits, found that three measures of Social Insight formed a distinct first-order factor, and that this Social Insight factor had a high loading on a second-order factor interpreted as "*g*". Finally, Wong et al. (1995), using a multitrait-multimethod study with college students, found that Social Perception, Social Knowledge, and Social Behavior could each be distinguished from Academic Intelligence, although convergent validities among the different factors of Social Intelligence were low. They also concluded that exclusive use of self- or other-reports of Social and Academic Intelligence may be problematic, because both self- and other-report formed coherent method factors in both of their two studies.

What are we to conclude from the above research? First, some—but not all—aspects of Social Intelligence may represent new types of intelligence. Second, maximum-performance tests are preferable to self- and other-reports of intelligence, as would be expected both on a theoretical level and based on the results of Davies et al. (1998).

Research on whether Emotional Intelligence is a type of intelligence has also been mixed. Three coherent factors emerged from the MEIS—a maximum-performance test designed by Mayer et al. (2000)—and there was a single higher-order factor. As well, scores increased with age, and one of the factors—Emotional Understanding—had a moderate correlation with Verbal Ability (r = .40). Other measures, however, appear almost independent of traditional forms of intelligence: the self-report EQ-i (Bar-On, 1997b), for example, has low correlations with the WAIS (Wechsler, 1958; r = .12) and the Reasoning scale of the 16PF (Cattell, Eber, & Tatsuoka, 1970; r = .13), in keeping with the developer's intention to represent *non-cognitive* abilities that predict success. I should mention parenthetically that—while there are such things as non-cognitive abilities (for example, physical abilities)—most of the characteristics that Bar-On refers to would be considered to be personality dimensions by most psychologists.

There has also been quite a bit of research on self-report measures of Emotional Understanding, particularly the Toronto Alexithymia Scale (TAS-20; Bagby, Taylor, & Parker, 1994; Parker, Bagby, & Taylor, 1989). The TAS-20 is a self-report measure of alexithymia, and I used it as a measure of Emotional Understanding. Although previous research has not explicitly tested the hypothesis that this instrument measures a personality dimension, researchers have often examined the relation of this test to the Big Five. Several researchers have found that the TAS-20 is positively correlated with Neuroticism (e.g., Bagby, Taylor, & Parker, 1994; Davies et al., 1998; Luminet et al., 1999; Mann, Wise, Trinidad, & Kohanski, 1994; Pandey & Madal, 1996; Parker, Bagby et al., 1989). The TAS-20 is also still positively related to Neuroticism when the correlations with depression have been taken into account (Wise & Mann, 1994; Wise, Mann, & Shay, 1992). As well, multiple studies have shown that the TAS-20 is negatively related to Extraversion (e.g., Luminet et al., 1999; Parker, Bagby, & Taylor, 1989), and that it continues to be negatively related to Extraversion after controlling for depression (Wise & Mann, 1994; Wise et al., 1992). Finally, some studies have shown that the TAS-20 is negatively related to Openness (Bagby, Taylor, & Parker, 1994; Luminet et al., 1999), Conscientiousness (Mann et al., 1994), and Agreeableness (Mann et al., 1994), and that it maintains these negative relations

with Openness (Wise & Mann, 1994; Wise et al., 1992) and Conscientiousness (Wise & Mann, 1994; Wise et al., 1992) after controlling for depression. This research suggests that, although the construct this instrument claims to measure (Emotional Understanding) sounds cognitive in nature, the TAS-20 itself may be more closely related to personality dimensions than types of intelligence.

In addition, Davies et al. (1998) found that another measure of Emotional Understanding—the TMMS Clarity subscale—had a substantial loading on Neuroticism (loading = –.55) in the second of their studies. This measure did not have a salient loading on Extraversion.

Thus it appears that, like Social Intelligence, only some aspects of Emotional Intelligence are likely to be legitimate types of intelligence, and at this point we do not know which aspects those are. Additional research is needed to directly test the hypothesis that measures of ESI tap types of intelligence, and this research needs to use a wider variety of self-report and maximum-performance measures.

Research Question

From this literature review and the discussion of the ESI subcomponents in the introduction, I conclude that some ESI subcomponents may be types of intelligence but others may be personality dimensions. Research has shown that some ESI measures tap cognitive abilities, and that some aspects of ESI are related to well-known personality dimensions. However, at this point, we know little about which ESI subcomponents are types of intelligence and which are personality dimensions, because this question has only been directly addressed for a few ESI subcomponents. This leads to the following research question:

> Which ESI subcomponents are types of intelligence and which are personality dimensions?

Research Approach

Determining if a particular ESI measure is assessing a type of intelligence or a personality dimension is a question of construct validity. If a test measures a certain construct (e.g., a type of intelligence), then that test will have relations with other tests that mimic the relations between the constructs the tests measure. Thus, if test a is designed to measure construct A, and test b is designed to measure construct B, and A and B are theorized to be related, then tests a and b should be related. If tests a and b are related, this provides some evidence that they measure their respective constructs. The more such relations are tested and found to hold, the stronger the evidence.

Evidence of construct validity can be divided into two types. First, does the test correlate with other tests it should correlate with? This is commonly known as convergent validity. Second, does the test have low correlations with other tests that it should be uncorrelated with? This is commonly referred to as discriminant validity.

Because most cognitive abilities are positively correlated (Cattell, 1971), but cognitive abilities and personality dimensions are largely independent (Hakstian & Cattell, 1978), if an ESI measure taps a type of intelligence, then it should be positively correlated with other types of intelligence, and have near-zero or small correlations with personality dimensions. In addition, because Socially Desirable Responding (SDR) will be measured in order to answer the research question addressed in Chapter 6, I can also use this information to determine whether or not a particular ESI measure taps a type of intelligence. Correlations with SDR should be small or near zero. If a particular ESI measure demonstrates convergent

validity with other measures of intelligence, and discriminant validity from both personality and SDR, this provides relatively strong evidence that the measure taps a type of intelligence.

In contrast, if an ESI measure taps a personality dimension, it should have near-zero correlations with measures of intelligence, and significant correlations with other personality dimensions. Because some personality dimensions are correlated with SDR while others are not, information regarding correlations with SDR will not be useful in determining if a particular ESI measure taps a personality dimension. If a particular ESI measure demonstrates convergent validity with personality measures and discriminant validity with measures of intelligence, this provides relatively strong evidence that the measure taps a personality dimension. This evidence is not quite as strong as the evidence for types of intelligence, however, because discriminant validity with only one set of variables will have been demonstrated.

I should mention that I am using the terms convergent and discriminant validity in slightly different ways than they were used by Campbell and Fiske (1959). Those authors defined these constructs somewhat more narrowly in the context of the multi-trait multi-method study. They defined convergent validity as the correlation between two tests designed to measure identical constructs using independent methods. I have generalized this concept, stating that the constructs need not be identical and that the methods need not be independent. Many authors now define convergent validity in this more general way.

Discriminant validity is our ability to distinguish between two independent constructs. Campbell and Fiske (1959) specified that discriminant validity requires that the test have low correlations with other tests designed to measure different constructs, and that the correlations of the test with other tests of the same construct be higher than the correlations of that test with tests of independent constructs. Many authors now use only the first part of this definition to define discriminant validity, and I have followed that approach. However, I have also incorporated the second part of the definition in the criteria being used to examine the construct validity of ESI measures: the correlations of a test with tests of *related* constructs should be higher than the correlations of that test with tests of independent constructs. This criterion is a generalization of the second part of Campbell and Fiske's definition.

For each ESI variable, the largest correlation with an intelligence composite was compared with the largest correlation with a personality composite, using William's (1959) T_2 statistic. If this test was significant, I concluded that the measure is more strongly related to one of the two domains. For example, if the largest correlation with an intelligence composite was .58, and the largest correlation with a personality composite was .21, and William's T_2 statistic was significant, then I concluded that this measure is more strongly related to the cognitive domain than the personality domain. I calculated the T_2 statistic to compare the largest intelligence correlation with the largest personality correlation for every ESI variable, although I have reported results only for those comparisons that reached statistical significance at the .001 level. See pages 32 – 37 of the Introduction for the rationale for the Type 1 error rates used.

Because three separate criteria were used—convergent validity, discriminant validity, and a comparison of the largest correlations with the personality and cognitive composites—it was possible—indeed expected—that some ESI measures would satisfy one or two of the criteria but not all three. However, because these different significance tests were based on quite different sample sizes, it was also possible that an ESI measure would demonstrate

convergent validity with the cognitive composites and discriminant validity with the personality composites, but have a slightly *larger* correlation with the personality composites than the cognitive composites. One such anomalous pattern of results did in fact occur, and the reader's attention will be drawn to it in the appropriate section. The possibility of such anomalous results reinforces the importance of obtaining all three types of evidence before concluding that a particular ESI measure taps a cognitive ability (or a personality dimension).

Hypotheses

I hypothesized that the first seven subcomponents of ESI (as listed in Table 1) are types of intelligence, while the latter seven are personality dimensions. I expected this to be seen in their correlations with other types of intelligence, personality, and SDR.

Method

The UBC Student Sample, as described in Chapter 2: The Dimensional Structure of Emotional and Social Intelligence, was used. The measures and data screening procedures involved were described in that chapter.

Data Analysis

Each of the factors that resulted from the dimensional analysis (see Table 19) and each of the 31 original ESI variables was correlated with cognitive composites, personality composites, and two measures of SDR. The magnitude of these correlations was compared with the magnitude of the correlations found for variables that are known to measure cognitive and personality dimensions (e.g., the 12 intelligence measures and the 23 personality facets) to assist in classifying each ESI measure.

Calculating Correlations

Each ESI variable (the 4 cognitive ESI factors and the original 31 variables) was correlated with 4 intelligence composites, 5 personality composites, and 2 measures of SDR. The intelligence composites were formed by taking the mean z-score of the three tests that were designed to measure them (see Table 2). The personality composites were formed by taking the mean z-score of the 4 – 5 facets that were designed to measure them (see Appendix D, Table D1). SDR was measured using the Impression Management and Self-Deceptive Enhancement subscales of the PDS: BIDR-7.

These correlations were first calculated for men and women separately. I then compared the 385 correlations for men with the corresponding correlations for women, and 11 of these were significant at the .01 level. This was somewhat more significant findings than would be expected by chance, if all correlations were equal for men and women. Therefore, where men and women did not have significantly different correlations, the correlation between the two variables was calculated using the data from both men and women; however, where there was a significant difference at the .01 level, separate correlations for men and women are reported and were used in all subsequent analyses. The rationale for this Type 1 error rate was given on pages 32 – 37 of the Introduction. The correlations have been divided into five tables: four for the cognitive subcomponents of ESI (one for each factor and the associated subscales); and one for the personality measures.

All available subjects were used for these calculations. However, different numbers of subjects completed the intelligence, personality, SDR, and ESI measures, so that these correlations are based on a variety of sample sizes. The sample sizes are given in Table 22, for the interested reader.

Table 22
Sample Sizes for the Correlations with the Intelligence Composites, Personality Dimensions, and Socially Desirable Responding Measures, for Men and Women

	Correlations with					
ESI Variables	**Types of Intelligence**		**Personality Dimensions**		**SDR Measures**	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Factor Scores	44	89	40	68	45	89
Set 1 Variables	92	209	42	72	47	96
Set 2 Variables	46	96	42	72	47	96
Personality Variables	41	72	42	72	42	72

Because these correlations were attenuated due to the lack of internal consistency of the measures involved, correlations that have been corrected for this attenuation were also calculated, and are given in the lower portion of each table. Although there is no existing expression for the variance of a fully-disattenuated correlation when reliabilities have been estimated using coefficient alpha, we can use the results of Hakstian, Schroeder, and Rogers (1988) to develop a reasonable rationale for performing inference with these disattenuated correlations. In that paper, Hakstian et al. developed an expression for the sampling variance of a disattenuated correlation, using a test-retest model to estimate reliability. They showed that the sampling variance of the disattenuated correlation was approximately equal to the sampling variance of the corresponding uncorrected correlation. In their simulations, the power of significance tests on the disattenuated correlations was never less than the power of the significance tests on the corresponding uncorrected correlations. Therefore we might infer that, in general, disattenuated correlations that accompany significant uncorrected correlations will normally be significant.

Comparison Correlations

Before attempting to interpret these results, it is important to obtain some sense of how large these correlations would be, if a particular ESI measure belonged in the cognitive domain, versus if it belonged in the personality domain. To get a sense of this, I decided to calculate these same correlations for variables known to measure intelligence (the 12 intelligence tests) and variables known to measure personality dimensions (the 23 IPIP personality facets). These correlations are given in Table 23 and are summarized in Table 24. These correlations were calculated using combined data sets from men and women, after mean-deviating the data within sex.

In calculating these correlations, I needed to keep in mind that sometimes correlations were calculated between a particular measure and a composite measure that is intended to measure the same construct. If the measure in question were used when calculating the composite, this would artificially inflate the size of the correlation because of the item overlap. Therefore, where a correlation was calculated between a particular intelligence measure and a composite of that same type of intelligence, this composite was formed without that particular measure being used. Similarly, when a correlation was calculated between a particular personality facet and a composite of that same Big Five dimension, the composite was formed from the remaining facets for that dimension.

Individual intelligence measures had moderate correlations with related composites (e.g., the correlation between the Advanced Vocabulary test and the composite measure of Verbal Ability formed from the Reading and Inventive Opposites tests): these correlations ranged from .31 to .60, with a mean of .46. The correlations with unrelated composites were lower on average, but had a larger range (.09 to .82, with a mean of .31). The correlations of intelligence measures with personality composites were low to moderate (0 to .27 in absolute value, with a mean of .11). Correlations with Socially Desirable Responding varied from near zero to small (.01 to .24 in absolute value, mean .09).

Individual personality measures had moderate to strong correlations with related composites (.38 to .80, mean of .62), near-zero to moderately strong absolute correlations with unrelated personality composites (.03 to .62, mean .27); and zero to moderate absolute correlations with intelligence composites (0 to .36, mean .09). Correlations with Socially Desirable Responding measures varied from near-zero to moderately strong (.01 to .58 in absolute value, mean .23).

Table 23
Correlations of Intelligence and Personality Measures with Intelligence and Personality Composites and Socially Desirable Responding Measures, for Men and Women Combined (Calculated for Comparison with Later Correlations)

	Intelligence Composites				Personality Composites					SDR Measures	
	VA	**VC**	**VZ**	**IR**	**N**	**E**	**O**	**A**	**C**	**IM**	**SDE**
Intelligence Measures											
AV	.55*	.15*	.18*	.13	−.27*	.01	.17	.10	.26*	.08	.24*
IO	.51*	.26*	.11	.17*	−.21	.16	.16	.09	.22	−.13	.11
RD	.60*	.25*	.20*	.30*	−.25*	.13	.17	−.00	.17	−.05	.22
HW	.25*	.41*	.26*	.29*	−.16	.12	−.10	.02	.01	.01	−.01
IW	.09	.42*	.22*	.22*	.20	.01	−.07	−.05	−.15	−.07	−.10
RW	.27*	.39*	.27*	.22*	−.13	.13	.14	.12	.14	.14	.16
FB	.10	.23*	.50*	.42*	−.03	.07	.10	−.07	.11	−.02	.17
PF	.15*	.23*	.57*	.47*	−.09	.14	.10	−.12	−.05	−.05	.15
SD	.23*	.35*	.47*	.46*	−.15	.14	.18	.07	.12	.12	.07
FC	.20*	.18*	.49*	.34*	−.06	.05	.04	−.00	.02	.03	.01
LS	.19*	.32*	.35*	.42*	−.12	.18	.05	.10	.08	.03	.14
NS	.17*	.23*	.41*	.31*	−.04	.18	.05	.07	−.04	.03	.01
Personality Measures											
N1	−.24*	−.02	−.12	−.05	.76*	−.45*	−.08	.05	−.11	.01	−.38*
N2	−.20	−.01	−.05	−.04	.62*	−.39*	−.21	−.40*	−.33*	−.23	−.35*
N3	−.27*	−.01	−.15	−.12	.76*	−.52*	−.20	−.10	−.36*	−.05	−.39*
N5	−.10	−.00	.06	.03	.38*	−.17	−.09	−.31*	−.48*	−.29*	−.25*
N6	−.36*	−.06	−.22	−.15	.70*	−.37*	−.17	.09	−.35*	−.01	−.37*
E1	.06	.17	.11	.16	−.43*	.80*	.32*	.32*	.22	.10	.32*
E2	.05	.05	.05	.11	−.40*	.79*	.24*	.09	.10	−.11	.25*
E3	.17	.08	.19	.14	−.39*	.63*	.35*	−.07	.15	−.08	.36*
E6	.09	.06	.13	.14	−.48*	.65*	.44*	.32*	.13	.04	.36*
O1	.11	.06	.16	.08	−.09	.23	.56*	.18	.16	.01	.31*
O2	.14	−.14	.06	−.07	−.12	.18	.49*	.53*	.35*	.25*	.18
O3	.05	−.03	.10	.09	.13	.29*	.48*	.34*	.25*	.15	.10
O4	.11	.00	.05	.03	−.36*	.43*	.48*	.24*	.15	.11	.34*
O5	.27*	.04	.20	.13	−.23	.25*	.50*	.08	.34*	.07	.36*
A2	.02	.07	−.04	.13	−.10	−.04	.13	.65*	.51*	.58*	.08
A3	.00	−.01	.04	.06	−.28*	.50*	.48*	.66*	.38*	.36*	.28*
A4	.01	.03	−.10	.05	−.14	−.06	.18	.69*	.39*	.40*	.07
A6	.11	.03	−.07	.01	−.05	.24*	.46*	.67*	.34*	.39*	.06
C1	.31*	.06	.13	.15	−.52*	.36*	.42*	.18	.56*	.21	.45*
C3	.07	.07	.02	.07	−.21	.09	.19	.62*	.56*	.46*	.16
C4	.29*	−.05	.12	−.03	−.34*	.27*	.44*	.44*	.68*	.30*	.16
C5	.14	−.03	.08	−.09	−.27*	.16	.30*	.37*	.65*	.29*	.15
C6	.14	−.06	−.08	−.00	−.21	−.23	−.03	.25*	.44*	.30*	.05

Table 23 con't

* $p < .01$.

Note. The correlations of a measure with its own associated domain are corrected correlations (the scale itself is not a part of the composite). These correlations and their significance levels are provided for descriptive purposes only. However, to prevent escalating Type 1 error rates, significance is only reported if p was less than .01. Even so, given that there are 365 correlations in this table, 3 or 4 of them are probably significant by chance alone. See pages 32 – 37 for the rationale for the Type 1 error rate used.

Among the cognitive measures, sample sizes varied from 291 to 302. Between personality measures and cognitive measures, sample sizes varied from 113 to 116. Among the personality measures, the sample size was 113. Between cognitive measures and SDR measures, the sample sizes varied from 142 to 145. Between personality measures and SDR, the sample size was 119.

VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. IR = Inductive Reasoning. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness. IM = Impression Management. SDE = Self-Deceptive Enhancement. AV = Advanced Vocabulary. IO = Inventive Opposites. RD = Reading. HW = Hidden Words. IW = Incomplete Words. RW = Rearranged Words. FB = Form Board. PF = Paper Folding. SD = Surface Development. FC = Figure Classification. LS = Letter Sets. NS = Number Series.

Table 24
Descriptive Statistics for the Absolute Values of the Correlations in Table 23 Above

Individual Measures	Composites	Mean	Std Dev	Min.	Max.	Number of Correlations
Intelligence	Related Intelligence	.46	.09	.31	.60	12
Intelligence	Unrelated Intelligence	.31	.22	.09	.82	36
Personality	Related Personality	.62	.11	.38	.80	23
Personality	Unrelated Personality	.27	.14	.03	.62	92
Personality	Intelligence	.09	.07	.00	.36	92
Intelligence	Personality	.11	.07	.00	.27	60
Intelligence	SDR	.09	.07	.01	.24	24
Personality	SDR	.23	.14	.01	.58	46

SDR = Socially Desirable Responding.

Strategy

Comparing these two lists, we can see that correlations with cognitive variables that were larger than .09 were larger than the average correlation between personality variables and intelligence composites. Therefore, if a correlation with a cognitive composite was significantly larger than .09, I concluded that it failed to show discriminant validity with the cognitive variables. In addition, correlations with personality variables that were larger than .11 were larger than the average correlation between a cognitive variable and a personality composite. If a correlation with a personality variable was significantly larger than .11, then I concluded that this variable failed to show discriminant validity with that personality dimension. Finally, correlations with Socially Desirable Responding (SDR) measures that were larger than .09 were larger than the average correlation between an intelligence composite and a SDR measure. Therefore, if a correlation with SDR was significantly larger than .09, I concluded that this variable failed to show discriminant validity with SDR.

Controlling Type 1 Error

In this section, approximately 400 correlations were calculated and tested for significance. To prevent the occurrence of large numbers of Type 1 errors, each individual significance test used a Type 1 error rate of .001. The rationale for this reduced Type 1 error rate was given in the Introduction. With this reduced Type 1 error rate, the probability that I made one or more Type 1 errors in this entire section is less than .40. The probability of having made a Type 1 error in any particular analysis is reported in the tables of statistical results.

Results

I will discuss the correlations for each type of ESI measure in turn.

Emotion Perception

The correlations for the variables related to the Emotion Perception factor are given in Table 25. Where possible, the combined correlation for men and women is given. If these correlations were significantly different (using alpha = .01), separate correlations for men and women are reported and were used in all decision-making. In the table, the correlation for men is reported first, and then the correlation for women is given.

None of the correlations for the Emotion Perception variables were large enough to reach statistical significance at the .001 level. There was thus no evidence of convergent validity for any measure for either cognitive or personality composites. From this analysis, it was not clear what these subscales measure.

Perceived Difficulty with Emotions

The correlations for the variables related to the Perceived Difficulty with Emotions factor are given in Table 26. As the reader can see by examining this table, none of the variables demonstrated convergent validity with the intelligence composites. One variable—the TEIS Regulation of Emotion in the Self subscale—had a significant correlation with Verbal Ability, but this correlation only held for men, and hence was not considered strong evidence of convergent validity. In addition, each of the variables failed to show discriminant validity from the personality composites and from the Socially Desirable Responding measures. From this data, there was no evidence that any of these variables measure cognitive variables.

Table 25

Correlations of Perception and Integration Factor Variables with Intelligence, Personality, and Socially Desirable Responding Variables, for Men and Women Combined

	Intelligence Composites				Personality Composites					SDR Meas.	
	VA	**VC**	**VZ**	**IR**	**N**	**E**	**O**	**A**	**C**	**IM**	**SDE**
					Uncorrected Correlations						
Factor 1	.20	.14	.03	.04	.06	.13	.11	.19	.18	.06	.08
Perception											
MSC A	.14	.10	.05	.14	–.06	.17	.10	.16	.13	–.08	.14
MSC F	.09	.08	–.03	–.01	.10	–.02	–.11	–.03	–.10	–.02	–.00
MSC J	–.14 / .19	.04	–.02	.03	.14	–.03	–.11	–.13	–.04	–.03	–.08
Integration											
MSC B	.13	–.00	–.05	.01	–.05	.19	.11	.07	.13	.01	.01
MSC G	.03	–.02	.00	.02	–.10	.17	.17	.23	.25	.13	.19
MSC K	.13	.02	–.02	.06	–.03	.09	.16	.11	.09	.06	.10
Other Measures											
Em Ap	.04	.05	–.05	–.05	.16	–.06	–.06	.03	.00	–.11	–.03
MSC I	–.12 / .24	.00	.05	.14	–.00	.20	.11	.11	.21	.17	–.01
					Correlations Corrected for Attenuation Due to Lack of Internal Consistency						
Factor 1	.28	.19	.04	.06	.08	.17	.14	.25	.23	.09	.12
Perception											
MSC A	.18	.12	.06	.19	–.07	.20	.12	.19	.15	–.11	.19
MSC F	.11	.10	–.04	–.01	.11	–.02	–.13	–.03	–.11	–.03	–.00
MSC J	–.17 / .23	.05	–.02	.04	.16	–.03	–.13	–.15	–.05	–.04	–.11
Integration											
MSC B	.16	–.00	–.06	.01	–.06	.22	.13	.08	.15	.01	.01
MSC G	.04	–.02	.00	.03	–.11	.19	.20	.27	.29	.17	.25
MSC K	.17	.03	–.03	.08	–.04	.11	.20	.13	.11	.08	.14
Other Measures											
Em Ap	.07	.09	–.09	–.10	.28	–.10	–.11	.05	.00	–.21	–.06
MSC I	–.15 / .30	.00	.06	.18	–.00	.23	.13	.13	.24	.22	–.01

Note. Where the correlations between men and women were different (using alpha = .01), the two correlations are given separately, with the correlation for men being given first.

No tabled correlation was significant at the required level ($p < .001$). See pages 32 – 37 for a discussion of the Type 1 error rate used. In addition, no correlation was large enough to indicate a lack of discriminant validity with cognitive, personality, or SDR variables.

Sample sizes varied from 113 to 301 for men and women combined. See Table 22 for details.

Because 101 significance tests were used in the above table, and each significance test used a Type 1 error rate of .001, the probability of making at least one Type 1 error in this table was no more than .101. Given that none of these correlations were significant, however, it is clear that no Type 1 errors were made.

Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.

VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. IR = Inductive Reasoning. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness. IM = Impression Management. SDE = Self-Deceptive Enhancement. EM AP = TEIS Emotional Appropriateness. MSC = MSCEIT.

Table 26

Correlations of Perceived Difficulty with Emotions Variables with Intelligence, Personality, and Socially Desirable Responding Variables, for Men and Women Combined

	Intelligence Composites				Personality Composites					SDR Meas.	
	VA	VC	VZ	IR	N	E	O	A	C	IM	SDE
					Uncorrected Correlations						
Factor 2	–.20	–.09	–.00	.01	.56*b	–.35*b	–.18	–.19	–.37*b	–.20	–.51*c
DDF	–.13	–.07	.06	.03	.31*b	–.39*b	–.19	–.21	–.29b	–.10	–.28*c
DIF	–.12	–.05	.08	.02	.47*b	–.28b	–.14	–.15	–.36*b	–.19	–.48*c
Repair	.26	.07	.18	.18	–.61*b	.52*b	.32*b	.23	.22	.18	.43*c
REG S	.55*a / .08	.01	.22	.19	–.79*b	.35*b	.06	.08	.19	.14	.50*c
					Correlations Corrected for Attenuation Due to Lack of Internal Consistency						
Factor 2	–.24	–.11	–.00	.01	.63*	–.39*	–.21	–.22	–.42*	–.25	–.66*
DDF	–.16	–.08	.07	.04	.35*	–.44*	–.22	–.24	–.33	–.13	–.37*
DIF	–.15	–.06	.10	.03	.54*	–.32	–.16	–.17	–.42*	–.25	–.63*
Repair	.32	.09	.22	.24	–.70*	.60*	.37*	.27	.26	.23	.57*
REG S	.66* / .10	.01	.26	.24	–.87*	.39*	.07	.09	.21	.18	.64*

* $p < .001$.

a = measure fails to show discriminant validity from cognitive variables. b = measure fails to show discriminant validity from personality variables. c = measure fails to show discriminant validity from Socially Desirable Responding.

Note. Where the correlations between men and women were different (using alpha = .01), the two correlations are given separately, with the correlation for men being given first.

Sample sizes varied from 133 to 301 for men and women combined. See Table 22 for details.

Because 56 significance tests were used in the above table, and each significance test used a Type 1 error rate of .001, the probability of making at least one Type 1 error in the above table was no more than .056.

Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.

VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. IR = Inductive Reasoning. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness. IM = Impression Management. SDE = Self-Deceptive Enhancement. DDF = TAS-20 Difficulty Describing Feelings. DIF = TAS-20 Difficulty Identifying Feelings. REPAIR = TMMS Repair. REG S = TEIS Regulation of Emotion in the Self.

Each of the five variables had significant correlations with at least two of the personality composites, demonstrating convergent validity with the personality dimensions. As well, all but one of these variables also demonstrated discriminant validity from the intelligence composites. Therefore, there is evidence that each of these measures—with the exception of the TEIS Regulation of Emotion in the Self subscale—measures a personality dimension.

The reader may recall that there was some difficulty with the interpretation of this factor, and that the label "Perceived Difficulty with Emotions" was not entirely satisfactory because it suggests that TEIS Recognition of Emotion in Others had a salient negative loading on this factor, but it did not. Examining the correlations between the factor scores and the personality dimensions, I noticed that this factor had a relatively strong relation with Neuroticism (r = .56, p < .001). When corrected for attenuation due to lack of internal consistency, this correlation became .63. It therefore appears that these factor scores measure some portion of that Big Five dimension.

Emotion Insight

The correlations for the variables related to the Emotion Insight factor are given in Table 27. With the exception of the factor scores, the Cartoon Predictions test, and the Social Translation test, each of these measures demonstrated convergent validity with the cognitive domain, and discriminant validity with the personality and SDR variables. Only one of these variables—the factor scores—demonstrated convergent validity with the personality composites, but these scores did not demonstrate discriminant validity from the intelligence composites. Therefore, it appeared that many of these tests are measuring the cognitive domain, and for none of them was there solid evidence that they are measuring the personality domain.

The results for one of these tests—the MSCEIT H—were somewhat anomalous. The correlation with Verbal Ability (r = .26, p < .001) provided evidence of convergent validity with the cognitive domain. The largest correlation with a personality composite (Openness, r = .27, p > .001) was not significantly larger than the average correlation between cognitive measures and personality composites, and therefore there was no evidence that the MSCEIT H lacks discriminant validity from personality composites. The criteria of convergent and discriminant validity thus appeared to suggest that this test measures a cognitive ability, even though the correlation with Openness was slightly larger than the correlation with Verbal Ability. These results were possible because the correlations with the cognitive composites were based on much larger sample sizes than the correlations with the personality composites (see Table 22 for details). The possibility of such results emphasizes the importance of obtaining all three types of evidence—convergent validity, discriminant validity, and a larger correlation with the cognitive domain than the personality domain—before concluding that a test measures a cognitive ability. Because of these conflicting results, I withheld my conclusion that the MSCEIT H measures a cognitive ability.

Table 27

Correlations of Emotion Insight Variables with Intelligence, Personality, and Socially Desirable Responding Variables, for Men and Women Combined

	Intelligence Composites				Personality Composites					SDR Meas.	
	VA	VC	VZ	IR	N	E	O	A	C	IM	SDE
					Uncorrected Correlations						
Factor 3	.55*a	.24	.31*a	.44*a	−.33*b	.31*b	.22	.07	.17	.08	.21
MSC C	.41*a	.22*	.10	.15	−.25	.18	.16	.10	.19	.05	.12
MSC D	.31*a	.08	.10	.15	−.22	.20	.05	.01	.16	.09	.23
MSC H	.26*a	.17	.07	.19*	−.11	.16	.27	.17	.27	.14	.22
MSC L	.29*a	.10	.25*a	.23*a	−.09	.07	−.06	.01	.05	.13	.07
LEAS	.28*a	.11	.09	.17	−.21	.25	.11	.15	.06	.03	.12
EX GR	.22*a	.13	.15	.08	−.09	.00	.11	−.02	.03	−.03	.10
CAR PR	.07	.10	.20	.10	.08	.17	.08	−.04	−.06	−.02	−.03
MS CR	.33*a	−.00	.19	.26	−.12	.22	.18	.02	−.01	−.01	.05
SOC TR	.48*a / .11	.19	.34 / −.07	.22	−.15	.19	.14	.10	.19	.12	.18
					Correlations Corrected for Attenuation Due to Lack of Internal Consistency						
Factor 3	.75*	.32	.42*	.63*	−.41*	.39*	.28	.09	.22	.11	.30
MSC C	.60*	.32*	.15	.23	−.34	.24	.22	.14	.26	.08	.19
MSC D	.49*	.12	.16	.25	−.32	.29	.07	.01	.24	.15	.39
MSC H	.39*	.25	.10	.30*	−.15	.22	.38	.24	.37	.22	.35
MSC L	.53*	.18	.46*	.45*	−.15	.12	−.10	.02	.09	.25	.14
LEAS	.41*	.16	.13	.26	−.28	.34	.15	.20	.08	.05	.19
EX GR	.44*	.26	.30	.17	−.17	.00	.21	−.04	.06	−.06	.21
CAR PR	.12	.17	.34	.18	.12	.26	.13	−.06	−.09	−.04	−.05
MS CR	.50*	−.00	.28	.41	−.17	.31	.26	.03	−.01	−.02	.08
SOC TR	.67* / .15	.26	.47 / −.10	.32	−.19	.24	.18	.13	.25	.18	.27

* $p < .001$.

a = measure fails to show discriminant validity from cognitive variables. b = measure fails to show discriminant validity from personality variables. None of the correlations with Socially Desirable Responding were large enough to indicate a lack of discriminant validity.

Note. Where the correlations between men and women were different (using alpha = .01), the two correlations are given separately, with the correlation for men being given first.

Sample sizes varied from 133 to 301 for men and women combined. See Table 22 for details.

Because 112 significance tests were used in the above table, and each test used a Type 1 error rate of .001, the probability of making at least one Type 1 error somewhere in this table was no more than .112. Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.

VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. IR = Inductive Reasoning. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness. IM = Impression Management. SDE = Self-Deceptive Enhancement. MSC = MSCEIT. LEAS = Levels of Emotional Awareness Scale. EX GR = Expression Grouping. CAR PR = Cartoon Predictions. MS CR = Missing Cartoons. SOC TR = Social Translations.

I would like to draw the reader's attention to the correlations that have been corrected for attenuation due to lack of internal consistency. The correlation between factor scores and Verbal Ability was .55, or .75 when it had been corrected for attenuation. This correlation was quite high, and indicated that factor scores have a lot of overlap with Verbal Ability. One possible interpretation of this would be to say that what these various tests have in common is their dependence upon Verbal Ability. However, this interpretation does not seem reasonable in this case, because three of the tests that loaded on this factor were non-verbal (Expression Grouping, Missing Cartoons, Cartoon Predictions). Therefore, I simply concluded that these factor scores had a high correlation with Verbal Ability.

The correlation between the MSCEIT C (Blends) and Verbal Ability was also high: the uncorrected correlation was .41, and when corrected for attenuation this became .60. This subscale therefore has quite a bit of overlap with Verbal Ability. This is not surprising, given that the test appears to be a vocabulary test for emotion words. This correlation is actually almost as high as the average correlation between an intelligence test and a composite measure of that same type of intelligence. As Table 24 showed, the average of these correlations was .46. Thus, it may be that the MSCEIT C is a new measure of Verbal Ability. On the other hand, the coefficient of determination between the MSCEIT C and Verbal Ability was .36, indicating that the MSCEIT C has quite a bit of unique variance. Further research on the relation of the MSCEIT C to Verbal Ability is needed.

Emotional Understanding of Others and Regulation of Emotion

The correlations for the variables related to Emotional Understanding of Others and Regulation of Emotion are given in Table 28. Only one of the measures—the MSCEIT E (Emotions in Relationships)—demonstrated convergent validity with the intelligence tests. This test also demonstrated discriminant validity from the personality dimensions and the SDR measures. The remaining three variables—the factor scores, the TEIS Recognition of Emotion in Others subscale, and the TEIS Regulation of Emotion in Others subscale—demonstrated convergent validity with the personality composites and discriminant validity from the intelligence composites. It therefore appears that the MSCEIT E measures a cognitive ability, while the remaining three variables measure personality dimensions.

In addition, I would like to point out that the correlation between the factor scores and Extraversion was very high ($r = .69$, $p < .001$). When this correlation was corrected for attenuation due to lack of internal consistency, it became .88. Therefore, it appeared that this factor could be re-interpreted either as measuring some portion of Extraversion or as measuring a set of skills that are likely to be learned by Extraverts to a greater extent than Introverts.

The TEIS Regulation of Emotion in Others subscale also had a high correlation with Extraversion ($r = .70$, $p < .001$). This correlation was higher than the average correlation between a personality measure and its related composite. As shown in Table 24, the average of those correlations was .62. When corrected for attenuation, the correlation between the Regulation of Emotion in Others subscale and Extraversion became .80. This strong relationship may be because this scale is measuring some portion of the domain of Extraversion, or it may be that Extraverts are better situated than Introverts to learn to regulate other people's emotions.

Table 28

Correlations of Emotional Understanding of Others and Regulation of Emotion Variables with Intelligence, Personality, and Socially Desirable Responding Variables, for Men and Women Combined

	Intelligence Composites				Personality Composites					SDR Meas.	
	VA	VC	VZ	IR	N	E	O	A	C	IM	SDE
					Uncorrected Correlations						
Factor 4	.22	.08	.20	.19	–.42*b	.69*b	.40*b	.30b	.33*b	.20	.36*c
REC O	.14	–.01	–.01	.03	–.25	.45*b	.36*b	.29*b	.32*b	.24	.37*c
MSC E	.29*a	.13	.19	.30*a	–.14	.24	.24	.08	.25	–.02	.00
REG O	.09	.06	.13	.04	–.34*b	.70*b	.33*b	.23	.30*b	.11	.37*c
					Correlations Corrected for Attenuation Due to Lack of Internal Consistency						
Factor 4	.30	.11	.27	.28	–.53*	.88*	.52*	.39	.43*	.29	.53*
REC O	.18	–.01	–.01	.04	–.29	.52*	.42*	.34*	.38*	.31	.49*
MSC E	.37*	.16	.24	.40*	–.16	.28	.29	.09	.30	–.03	.00
REG O	.11	.07	.16	.05	–.39*	.80*	.38*	.27	.35*	.14	.49*

* $p < .001$.

a = measure fails to show discriminant validity from cognitive variables. b = measure fails to show discriminant validity from personality variables. c = measure fails to show discriminant validity from Socially Desirable Responding.

Note. Where the correlations between men and women were different (using alpha = .01), the two correlations are given separately, with the correlation for men being given first. Sample sizes varied from 133 to 301 for men and women combined. See Table 22 for details.

Because 44 significant tests were used, and each test had a Type 1 error rate of .001, the probability of making at least 1 Type 1 error somewhere in the above table was no more than .044. Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.

VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. IR = Inductive Reasoning. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness. IM = Impression Management. SDE = Self-Deceptive Enhancement. REG O = TEIS Regulation of Emotion in Others. MSC E = MSCEIT E (Emotion in Relationships). REC O = TEIS Recognition of Emotion in Others.

Personality Subcomponents of ESI

The correlations for each of the seven personality subcomponents of ESI are given in Table 29. For none of these seven variables was there evidence of convergent validity with the intelligence composites, or discriminant validity from the personality variables. Therefore, it does not appear that any of these scales measure cognitive abilities. In contrast, for each of these variables, there was evidence of convergent validity with the personality composites, and discriminant validity from the intelligence composites. It therefore appears that each of these variables measures a personality dimension.

Comparing the Largest Correlation with an Intelligence Composite with The Largest Correlation with a Personality Composite

Next I examined each of the ESI variables to determine if it was more closely associated with the cognitive domain or the personality domain, by comparing the largest absolute correlation with the intelligence composites to the largest absolute correlation with the personality composites, using William's T_2 (1959) statistic. The results for the variables with significant differences are given in Table 30.

Two of the factor scores—Perceived Difficulty with Emotions, and Emotional Understanding of Others and Regulation of Emotion—were more closely associated with the personality domain than the cognitive domain. No variable was more closely associated with the cognitive domain than the personality domain.

Conclusions

Summary

A summary of my findings is given in Table 31. From this table, the reader will see that the following variables demonstrated convergent validity with the intelligence composites, and discriminant validity from both the personality composites and the Socially Desirable Responding measures: MSCEIT C Blends, MSCEIT D Progressions, MSCEIT H Transitions, MSCEIT L Analogies, Levels of Emotional Awareness Scale, OGSI Expression Grouping, OGSI Missing Cartoons, and MSCEIT E Emotions in Relationships. For all of these except the MSCEIT H the largest correlation with a cognitive composite was larger than the largest correlation with a personality composite, thus suggesting that these tests may measure cognitive abilities, but for none of these tests was this difference statistically significant. Therefore, for none of these measures was there compelling evidence at this point that they measure cognitive abilities.

The following variables demonstrated convergent validity with the personality composites and discriminant validity from the cognitive composites: Factor 2 factor scores (Perceived Difficulty with Emotions), TAS-20 Difficulty Describing Feelings, TAS-20 Difficulty Identifying Feelings, TMMS Repair, Factor 4 factor scores (Emotional Understanding of Others and Regulation of Emotion), TEIS Regulation of Emotion in Others, TEIS Recognizing Emotions in Others, Positive Expressivity, TMMS Attention, TEIS Flexible Planning, QSE Positive Sharing, TEIS Empathy, and IRI Empathic Concern. In addition, eight of these variables (2 factor scores and 6 self-report measures) were more closely associated with the personality domain than the cognitive domain.

Table 29

Correlations of Personality Subcomponents of ESI with Intelligence, Personality, and Socially Desirable Responding Variables, for Men and Women Combined

	Intelligence Composites				Personality Composites					SDR Meas.	
	VA	VC	VZ	IR	N	E	O	A	C	IM	SDE
					Uncorrected Correlations						
PES	.12	.07	.13	.02	–.29b	.69*b	.40*b	.33*b	.15	.10	.31*c
NES	–.12	.00 / –.32	–.01	–.05	.68*b / .16	.01	.09	–.09	–.64*b / .10	–.21	–.01
ATT	–.05 / .29	.13	.06	.03	–.26	.37*b	.50*b	.42*b	.34*b	.29c	.35*c
FL PL	.13	–.11 / .22	.00	.10	–.20	.30*b	.40*b	.31*b	.14	.20	.21
POS SH	.10	.10	.18	.05	–.10	.35*b	.25	.34*b	.17	.23	.28c
EMP	–.18 / .17	.18	–.00	.00	.08	.27	.34*b	.57*b	.15	.25	.01
EM CN	.05	.15	–.04	.02	–.06	.33*b	.28	.58*b	.18	.30*c	.09
					Correlations Corrected for Attenuation Due to Lack of Internal Consistency						
PES	.15	.09	.16	.03	–.34	.80*	.47*	.39*	.18	.13	.42*
NES	–.16	.00 / –.41	–.01	–.07	.82* / .19	.01	.11	–.11	–.78* / .12	–.29	–.01
ATT	–.06 / .36	.16	.07	.04	–.30	.42*	.58*	.49*	.39*	.37	.46*
FL PL	.16	–.13 / .27	.00	.13	–.23	.34*	.46*	.36*	.16	.26	.28
PS SH	.13	.12	.23	.07	–.12	.41*	.30	.40*	.20	.30	.38
EMP	–.22 / .20	.21	–.00	.00	.09	.30	.38*	.64*	.17	.31	.01
EM CN	.06	.19	–.05	.03	–.07	.39*	.33	.69*	.21	.40*	.12

* $p < .001$.

b = measure fails to show discriminant validity from personality variables. c = measure fails to show discriminant validity from Socially Desirable Responding. None of the correlations with the cognitive composites were large enough to indicate a lack of discriminant validity.

Note. Where the correlations between men and women were different (using alpha = .01), the two correlations are given separately, with the correlation for men being given first.

Sample sizes varied from 113 to 114 for men and women combined. See Table 22 for details.

Because 83 significance tests were used in the above table, and each one used a Type 1 error rate of .001, the probability of making at least one Type 1 error in the above Table was no more than .083.

Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.

VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. IR = Inductive Reasoning. N = Neuroticism. E = Extraversion. O = Openness. A = Agreeableness. C = Conscientiousness. IM = Impression Management. SDE = Self-Deceptive Enhancement. PES = Positive Expressivity Scale. NES = Negative Expressivity Scale. ATT = TMMS Attention. FL PL = TEIS Flexible Planning. PS SH = QSE Positive Sharing. EMP = TEIS Empathy. EM CN = IRI Empathic Concern.

Table 30

Comparison of the Largest Absolute Correlation with a Cognitive Ability with the Largest Absolute Correlation with a Personality Variable, Selected Results

	Variables		Correlations				
Measure	**Cog.**	**Per.**	**Cog.**	**Per.**	***n***	**T_2**	***p***
Factor 2	VA	N	–.23	.58	113	3.73	.0003
Factor 4	VA	E	.22	.69	113	4.90	.0000
TEIS Regulation of Emotion in Self: Men	VA	N	.55	–.79	41	2.24	.0308
TEIS Regulation of Emotion in Self: Women	VZ	N	.22	–.79	113	6.11	.0000
TAS-20 Difficulty Identifying Feelings	VA	N	–.12	.47	113	3.48	.0007
TMMS Repair	VA	N	.26	–.62	113	3.97	.0001
TEIS Regulation of Emotions in Others	VZ	E	.13	.70	113	6.11	.0000
Positive Expressivity	VZ	E	.14	.69	113	5.83	.0000
TEIS Empathy	VC	A	.17	.57	113	3.58	.0005
IRI Empathic Concern	VC	A	.16	.58	113	3.78	.0003

Note. To prevent excessive numbers of Type 1 errors, these comparisons needed to obtain *p* values of less than .001 to be considered significant. Because there were 31 variables for which these correlations were compared, the probability of making at least one Type 1 error in this set of comparisons was approximately .031. See pages 32 – 37 for the rationale for this Type 1 error rate.

The sample size given in the Table and used in calculations was the smallest sample size for the three relevant correlations: the correlation between the ESI variable and the intelligence composite; the correlation between the ESI variable and the personality composite; and the cross-correlation between the cognitive composite and the personality composite.

T_2 = William's (1959) T_2 statistic for comparing dependent correlations. Cog. = Cognitive. Per. = Personality. VA = Verbal Ability. VC = Verbal Closure. VZ = Visualization. N = Neuroticism. E = Extraversion. A = Agreeableness.

Table 31
Decisions Regarding Convergent and Discriminant Validity of ESI Variables

Measure	Cognitive?			Personality?		Str.	Conclusion
	Con. Cog.	Dis. Per.	Dis. SDR	Con. Per.	Dis. Cog.		
Factor 1		y	y		y		
MSCEIT A Faces		y	y		y		
MSCEIT F Landscapes		y	y		y		
MSCEIT J Designs		y	y		y		
MSCEIT B Synesthesia		y	y		y		
MSCEIT G Facilitation		y	y		y		
MSCEIT K Sensation Translation		y	y		y		
TEIS Emotional Appropriateness			y		y		
MSCEIT I Emotion Management		y	y		y		
Factor 2				y	y	Per	Per
TAS-20 Difficulty Describing Feelings				y	y		Maybe Per
TAS-20 Difficulty Identifying Feelings				y	y	Per	Per
TMMS Repair				y	y	Per	Per
TEIS Regulation of Emotions in the Self				y			
Factor 3	y		y	y			
MSCEIT C Blends	y	y	y				Maybe Cog
MSCEIT D Progressions	y	y	y				Maybe Cog
MSCEIT H Transitions	y	y	y				
MSCEIT L Analogies	y	y	y				Maybe Cog
Levels of Emotional Awareness Scale	y	y	y				Maybe Cog
OGSI Expression Grouping	y	y	y				Maybe Cog
OGSI Cartoon Predictions		y	y		y		
OGSI Missing Cartoons	y	y	y				Maybe Cog
OGSI Social Translations		y	y				
Factor 4				y	y	Per	Per
TEIS Regulation of Emotions in Others				y	y	Per	Per
MSCEIT E Emotions in Relationships	y	y	y				Maybe Cog
TEIS Recognizing Emotions in Others				y	y		Maybe Per

Table 31 con't

Measure	Cognitive?			Personality?		Str.	Conclusion
	Con. Cog.	Dis. Per.	Dis. SDR	Con. Per.	Dis. Cog.		
Positive Expressivity				y	y	Per	Per
Negative Expressivity			y		y		
TMMS Attention				y	y		Maybe Per
TEIS Flexible Planning			y	y	y		Maybe Per
QSE Positive Sharing			y	y	y		Maybe Per
TEIS Empathy			y	y	y	Per	Per
IRI Empathic Concern				y	y	Per	Per

Con. = Convergent Validity. Dis. = Discriminant Validity. Cog. = Cognitive.
Per. = Personality. SDR = Socially Desirable Responding. Str. = Stronger Relation.

I used six self-report measures of the ability to understand and manage one's own emotions—concepts that sound cognitive in nature. However, for 5 of these 6 measures—TAS-20 Difficulty Describing Feelings, TAS-20 Difficulty Identifying Feelings, TMMS Repair, TEIS Regulation of Emotion in Others, and TEIS Recognition of Emotion in Others—I found evidence that they measure personality dimensions: each of these measures demonstrated convergent validity with personality composites and discriminant validity from cognitive composites, and three of these subscales were more closely associated with the personality domain than the cognitive domain. Therefore, despite the fact that the concepts being measured sound cognitive in nature, researchers should not claim that these subscales measure types of intelligence. Apparently these subscales are unable to overcome the method bias of using the self-report format.

Relation of the Results to My Original Hypotheses

Originally, I hypothesized that all of the measures of cognitive subcomponents of ESI (both self-report and maximum-performance) assess types of intelligence, and are more closely associated with the cognitive domain than the personality domain. I found that many maximum-performance measures of the cognitive subcomponents of ESI demonstrated convergent validity with cognitive abilities, but none of these subscales were more closely associated with the cognitive domain than the personality domain. In contrast, none of the self-report measures of the cognitive subcomponents of ESI measured cognitive abilities, and none of them were more closely associated with the cognitive domain than the personality domain.

I also hypothesized that each of the personality subcomponents of ESI was indeed a personality measure. For six of the seven measures, I found evidence of this: there was convergent validity with at least one of the personality composites and discriminant validity from each of the intelligence composites; and for three of the measures, the correlations with personality composites were significantly larger than the correlations with the cognitive composites.

Given the complete failure of self-report measures of ESI to demonstrate convergent validity with the cognitive variables, the complete failure of these measures to demonstrate discriminant validity from the personality composites, and the frequent failure of these measures to demonstrate discriminant validity from the measures of Socially Desirable Responding, I conclude that researchers should not claim that self-report measures of ESI measure any type of intelligence.

Relation of the Results to Previous Research

My findings for self-report measures are similar to those found with self-report measures of ESI in three previous studies. First, Davies et al. (1998) found in their first study that several self-report measures of ESI loaded on factors that were marked by personality variables, rather than forming separate factors or loading on factors that were marked with cognitive variables. In the second of their studies, they found that most ESI measures loaded on both cognitive and personality factors, but that self-report measures of ESI had their highest pattern coefficients for personality factors while the one maximum-performance measure of ESI had its highest loading on a cognitive factor. It therefore appeared that method bias had a strong influence on their results. Second, Wong et al. (1995) cautioned against the use of self-report (and other-report) measures of Social Intelligence: these measures formed coherent method factors in both of their two studies. Third, Bar-On (1997b) found a low correlation between his self-report measure of Emotional Intelligence

and the Reasoning scale of the 16PF. Thus, the findings of these four studies (Davies et al., Wong et al., Bar-On, and the current study) converge on the conclusion that self-report measures are only weakly related to intelligence: they appear to be unable to overcome this method bias. Researchers should not claim that these subscales measure types of intelligence.

My findings with maximum-performance measures of ESI are consistent with some previous research on Emotional Intelligence. Mayer et al. (2000) found that their Emotional Understanding factor had a moderate correlation with Verbal Ability (r = .40). This factor corresponds most closely to my third factor, Emotional Insight, which was also moderately related to Verbal Ability (r = .55, p < .01). These two studies thus converge on the conclusion that Emotional Understanding as measured by the MSCEIT and other existing maximum-performance tests is closely associated with Verbal Ability. In contrast, they found that their other factors—Perception of Emotion, and Emotion Management—were not strongly related to Verbal Ability. This is similar to my finding that Emotion Perception did not show convergent validity with measures of intelligence. Our findings thus converge on the conclusion that other maximum-performance measures of ESI are less strongly associated with intelligence.

My research has also gone beyond previous findings on the relation of ESI to cognitive and personality variables, by demonstrating that some measures of ESI and some ESI factors are clearly personality variables. These measures and factors should not be labeled as types of intelligence.

Final Word

At this point, there is insufficient evidence to justify the use of the term "intelligence" for any of the ESI measures studied. For many maximum-performance measures of ESI there was some evidence that they measure cognitive abilities, but none of these were more closely associated with the cognitive domain than the personality domain. For most self-report measures there was some evidence that they measure personality dimensions and for several of the measures the evidence was quite clear. Future test development efforts for ESI should focus on the most promising ESI subcomponents: Emotional Understanding and Social Insight. Test development for other ESI subcomponents should of course also proceed, but we should not claim that these tests measure types of intelligence.

CHAPTER 4: RELATION OF EMOTIONAL AND SOCIAL INTELLIGENCE TO OTHER TYPES OF INTELLIGENCE

Background

Cognitive abilities appear to be organized in a hierarchical structure. At the lowest level of this structure are individual tests of cognitive abilities. A test can be defined as a cognitive test if the items on the test are cognitive tasks. Carroll (1993) defines a task as "any activity that a person may engage in (or be made to engage in) in order to achieve a specifiable class of terminal states of affairs, [assuming] that the person [has] a notion of what is to be performed" (p. 9). Tasks are considered to be *cognitive* if they "centrally involve mental functions ... in the performance of the task" (p. 10). Thus, both orally repeating a series of six verbally-presented numbers and lifting a barbell would be considered tasks, but only the first of these is cognitive.

Carroll (1993) defines an ability as the potential for present performance on a defined class of tasks; hence, a cognitive ability is the potential for performance on a defined class of cognitive tasks. In Carroll's terminology, ability is a neutral term, applying equally to aptitude and achievement tests.

At the next level of the hierarchy of cognitive abilities are the Primary Mental Abilities (Cattell, 1987; Thurstone, 1938) or first-stratum cognitive abilities (Carroll, 1993). Verbal Ability, Ideational Fluency, Reaction Time, and Numerical Facility are all considered to be first-stratum cognitive abilities (Carroll, 1993). These Primary Mental Abilities were discovered through factor analysis of individual tests of cognitive abilities, and thus were empirically-derived. The first-order factors that result from the analysis of a wide range of cognitive tests are usually assumed to be first-stratum cognitive abilities. However, if an insufficient number of marker variables are included for each of the first-stratum abilities, the factors that result will not reflect first-stratum abilities. Thus, as a larger number and wider range of cognitive variables have been studied over the decades, a greater number of first-stratum abilities have been proposed.

The correlations among first-stratum abilities can themselves be factor analyzed. This results in higher-order factors. These factors are often interpreted as second-stratum cognitive abilities, and include Crystallized Intelligence, Fluid Intelligence, Visual Perception, Memory, and Speededness (Carroll, 1993; Cattell, 1987; Thurstone, 1938).

At the highest level of the hierarchical model of cognitive abilities, many researchers argue that a single overall factor appears. This factor is referred to as "g", and is interpreted as a third-stratum cognitive ability (Carroll, 1993).

Current models include dozens of first-stratum abilities and about eight to ten second-stratum abilities. For example, based on his re-analysis of over 100 data sets, Carroll identified 55 *well-replicated* Primary Mental Abilities, and 8 *well-replicated* second-order factors (see Carroll, 1993, Figure 15.1), from among a total of 22 *possible* second-order factors and 155 *possible* first-order factors that he identified.

Of the higher-order cognitive abilities, Fluid and Crystallized Intelligence are the most closely associated with our conception of intelligence. Fluid Intelligence involves the basic intellectual processes of manipulating abstractions, rules, generalizations, and logical relations. It represents a person's problem-solving ability, and is hypothesized to be largely inherited (Cattell, 1987). Crystallized Intelligence reflects the role of learning and acculturation, and is believed to result from the investment of Fluid Intelligence in domains that are valued by the culture. Thus, differences in Crystallized Intelligence reflect

differences in how much people have learned, and are believed to be influenced by Fluid Intelligence because people with greater problem-solving abilities are able to learn more (Cattell, 1987). Crystallized Intelligence is hypothesized to be less influenced by genetic factors than Fluid Intelligence, because of the influence of environmental differences on how much people learn.

To my knowledge only three papers have attempted to examine the relation of Emotional Intelligence, Social Intelligence, Empathy, or Alexithymia to the hierarchical structure of cognitive abilities just outlined. The first of these was a study conducted by Legree (1995) using three measures of Social Insight. Four hundred U.S. Air Force recruits were administered three measures of Social Insight and the Armed Services Vocational Aptitude Battery (ASVAB; U.S. Department of Defense, 1984), which contains 10 separate cognitive tests. Five factors were found: Verbal, Speed, Quantitative, Social Insight, and Technical. All three of the Social Insight measures and none of the ASVAB scales loaded on the Social Insight factor.

Legree (1995) conducted a higher-order factor analysis, and found that the Social Insight factor had a high loading (.71) on the one second-order factor. He interprets this second-order factor as a measure of "g".

Legree's (1995) research is important because it showed that at least some aspects of ESI are cognitive abilities, distinguishable from other cognitive abilities but related to them. However, only a single ESI subcomponent was examined: Social Insight. If a wider range of ESI subcomponents were studied, it would be possible to determine if they represent distinct Primary Mental Abilities, or whether two or more of these subcomponents collapse together.

The second paper that examined the relation of the ESI subcomponents to the hierarchical structure of cognitive abilities is Davies et al. (1998). As the reader will recall, this paper described three studies, each of which included a factor analysis of ESI, personality, and cognitive variables. In the second and third studies, an insufficient number of marker variables were included to identify lower-order ESI factors, and therefore I will only discuss their first study.

In the first study, they included 20 ESI measures, 3 measures for each of Fluid and Crystallized Intelligence, and 3 personality measures. The ESI measures loaded on six factors. Three of these were interpreted as Emotional Intelligence factors: Emotional Clarity, Emotional Awareness, and Emotion Perception. The remaining three were interpreted as personality factors because each of these factors had a salient loading from one of the personality measures. None of the ESI measures had salient pattern coefficients on the Fluid or Crystallized Intelligence factors. A higher-order factor analysis was not undertaken.

Interpretation of these findings is not straight-forward, because Fluid and Crystallized Intelligence are second-stratum abilities and there is no evidence that the 20 ESI measures that they included each represent a distinct first-stratum ability. In fact, in their introduction they suggest that there are probably four "lower-order (i.e., primary) factors" (p. 990), not 20. This study therefore combined measures from different levels of the hierarchy of cognitive abilities. Because of this, these findings are unable to distinguish between the rival hypotheses that (a) the ESI measures that formed their own factors are related to separate second-stratum cognitive abilities, (b) these ESI measures are related to separate first-stratum cognitive abilities but have the same second-stratum cognitive abilities as some of the other cognitive ability measures used, and (c) these ESI measures do not measure cognitive abilities at all.

Because of these methodological shortcomings, the Davies et al. paper (1998) was less informative than the Legree (1995) article was. From their studies we are unable to determine whether some ESI subcomponents represent types of intelligence, and, if they do represent types of intelligence, at what level of the hierarchy of cognitive abilities they fall.

Finally, one additional paper addressed the relation between some aspects of ESI and the hierarchical structure of cognitive abilities. Horn (1998) claimed that Behavioural Relations (the ability to make judgments about how people interact and behave and the ability to estimate others' feelings) loads on Crystallized Intelligence. He made this claim based on his previous research with a single 20-item measure from an old version of the Kit of Factor-Referenced Cognitive Tests (John Horn, personal communication, 1999). This research thus suggests that at least some ESI subcomponents load on Crystallized Intelligence, but is limited in that there is no evidence that Behavioural Relations is a distinct first-stratum ability (this appears to have been assumed).

In summary, some tests of ESI subcomponents may measure types of intelligence. At this point, though, we do not know if they form a single Primary Mental Ability, or a small handful. In addition, we do not know if the Primary Mental Abilities associated with these measures load on Crystallized Intelligence or Fluid Intelligence, or whether they form a separate higher-order cognitive ability. It seems likely that Primary Mental Abilities associated with ESI subcomponents will load on Crystallized Intelligence, but the empirical evidence for this hypothesis is very weak at this time.

Research Question

Based on this literature review, I conclude that little research has examined the relation of ESI subcomponents to the hierarchical structure of cognitive abilities. What research has been done has either been inconclusive or has covered only a few of the cognitive subcomponents of ESI. This leads to the following research question:

> How are cognitive subcomponents of ESI related to the hierarchical structure of cognitive abilities?

Research Approach

Two methods of examining the relation of ESI measures to the hierarchical structure of cognitive abilities are possible. First, if there are several measures available that all seem to measure the same ESI subcomponent, then these ESI measures could be entered into a factor analysis, along with measures of a number of other types of intelligence. The measures of the other types of intelligence should be selected to cover at least two subfactors of Crystallized Intelligence and two subfactors of Fluid Intelligence. Then, a hierarchical factor analysis can be done, to determine if these ESI measures do indeed form a Primary Mental Ability, and to determine how this Primary Mental Ability is related to Fluid and Crystallized Intelligence.

A second, somewhat less conclusive approach would be to correlate the ESI measures with various types of intelligence that have been selected to represent both Fluid and Crystallized Intelligence. This approach would be less definitive than the hierarchical factor analysis for two reasons. First, if a measure was related to both Fluid and Crystallized Intelligence, this analysis would not tell us if it would have salient pattern coefficients for both factors or just one (because Fluid and Crystallized Intelligence themselves are correlated). Second, if a variable had small correlations with both Fluid and Crystallized Intelligence, this analysis would not tell us if that variable were related to a higher order

construct (e.g., "g"). Because of the greater information given by the higher-order factor analysis, that approach will be used.

Hypotheses

I hypothesized that measures of cognitive subcomponents of ESI represent one or more Primary Mental Abilities and are related to Crystallized Intelligence. Based on the dimensional analysis of ESI measures conducted in Chapter 2, I expected to obtain four ESI Primary Mental Abilities.

Method

The UBC Student Sample, as described in Chapter 2: The Dimensional Structure of Emotional and Social Intelligence, was used. The measures and data screening procedures involved were described in that chapter.

Data Analysis

Two factor analyses were undertaken to examine the relation of the cognitive subcomponents of ESI to the hierarchical structure of cognitive abilities. These factor analyses were based on the 24 cognitive ESI measures and the 12 intelligence measures listed in Table 2.

Testing Assumptions: Determining if Men and Women Should be Analyzed Together

Comparing Means

The means for men and women on the 36 variables (24 cognitive ESI measures and 12 intelligence measures) were compared using Hotelling's (1931) T^2 procedure. The differences between the two groups came close to reaching statistical significance ($T^2 = .574$, $F(36, 95) = 1.515$, $p = .057$). Therefore, to remove the possibility of confusing between-group differences with within-group differences, all data were mean-deviated within-sex before conducting the factor analysis.

Comparing Variance-Covariance Matrices

The variance-covariance matrices for men and women were compared using the Box test (Box, 1949). There was a significant difference between these two groups ($M = 1170.7$, Chi-square$(666) = .785.6$, $p < .001$). Therefore, ideally separate factor analyses would be conducted for men and women. This was not possible in this situation, because the Set 2 cognitive ESI variables had small sample sizes for men ($n = 46$). Therefore a combined analysis was done, by pooling the standard scores for men and women. The correlations among these 36 variables are given in Table 32. Sample sizes for the correlations ranged from 143 to 302.

First-Order Factor Analysis

The 36 measures were entered into a common-factor analysis. The scree plot had a clear break at five factors, and there were 11 eigenvalues greater than 1. Because of the clarity of the scree plot, five factors were extracted. Three Harris-Kaiser transformations were examined, and the cleanest factor pattern matrix was found with $c = 0$. This pattern matrix had 2 complex variables and 54% of the coefficients fell on the hyperplane.

Second-Order Factor Analysis

In the second-order factor analysis, I analyzed the correlations among the five factors that resulted from the first-level factor analysis. This second-order factor analysis was necessary to determine the relation of the first-order ESI factors to the hierarchical structure of cognitive abilities, and to demonstrate that some aspects of ESI are Primary Mental Abilities. The existence of first-order factors in itself does not tell us how we should interpret those factors.

Table 32
Correlations among the 24 ESI Variables in Set 1 and Set 2 and the 12 Intelligence Tests, for Men and Women Combined

	Advanced Vocabulary	Inventive Opposites	Reading	Rearrang. Words	Hidden Words	Incomplete Words
Advanced Vocabulary	1.0000 (302)					
Inventive Opposites	.3822* (302)	1.0000 (302)				
Reading	.5421* (302)	.4890* (302)	1.0000 (302)			
Rearranged Words	.1971* (293)	.2318* (293)	.2189* (293)	1.0000 (293)		
Hidden Words	.1239 (302)	.2335* (302)	.2413* (302)	.3287* (293)	1.0000 (302)	
Incomplete Words	.0196 (300)	.1083 (300)	.0896 (300)	.3363* (291)	.3580* (300)	1.0000 (300)
Form Board	.0620 (302)	.0704 (302)	.1012 (302)	.1950* (293)	.1801* (302)	.1462 (300)
Paper Folding	.1741* (302)	.0586 (302)	.1364 (302)	.1726* (293)	.1698* (302)	.1570* (300)
Surface Develop.	.1922* (302)	.1307 (302)	.2374* (302)	.2705* (293)	.2840* (302)	.2347* (300)
Letter Series	.0436 (302)	.1730* (302)	.2434* (302)	.2076* (293)	.2826* (302)	.2277* (300)
Figure Classif.	.1309 (302)	.1047 (302)	.2489* (302)	.1193 (293)	.1872* (302)	.0849 (300)
Number Series	.1245 (302)	.0875 (302)	.1853* (302)	.1575* (293)	.1795* (302)	.1805* (300)
MSCEIT A	.0655 (301)	.1089 (301)	.1531* (301)	.1664* (292)	.0260 (301)	.0417 (299)
MSCEIT B	.1025 (301)	.1641* (301)	.0684 (301)	.0085 (292)	.0417 (301)	−.0441 (299)
MSCEIT C	.2175* (301)	.4076* (301)	.3609* (301)	.2433* (292)	.2483* (301)	.0293 (299)
MSCEIT D	.2968* (301)	.2473* (301)	.1982* (301)	.1551* (292)	.0509 (301)	−.0097 (299)
MSCEIT F	.0171 (299)	.1213 (299)	.1033 (299)	.0757 (290)	.0403 (299)	.0715 (298)
MSCEIT G	−.0090 (299)	.0705 (299)	.0228 (299)	−.0306 (290)	.0092 (299)	−.0160 (298)
MSCEIT H	.1798* (299)	.2519* (299)	.2064* (299)	.1464 (290)	.1863* (299)	.0757 (298)
MSCEIT J	.0444 (300)	.0899 (300)	.0937 (300)	−.0072 (291)	.0732 (300)	.0799 (298)
MSCEIT K	.0773 (295)	.1306 (295)	.1167 (295)	.0202 (286)	−.0066 (295)	.0481 (294)

* $p < .01$.

Table 32 con't

	Advanced Vocabulary	Inventive Opposites	Reading	Rearrang. Words	Hidden Words	Incomplete Words
MSCEIT L	.2622*	.1487	.2975*	.1118	.0994	.0216
	(292)	(292)	(292)	(283)	(292)	(291)
LEAS	.1583*	.2347*	.2636*	.1379	.0919	.0030
	(302)	(302)	(302)	(293)	(302)	(300)
DDF	−.1115	−.0824	−.1232	−.1651*	.0291	−.0256
	(300)	(300)	(300)	(291)	(300)	(298)
DIF	−.1216	−.0488	−.1288	−.1323	−.0522	.0366
	(300)	(300)	(300)	(291)	(300)	(298)
Emotional	−.0324	.0803	.0404	.0807	.0129	.0389
Appropriat.	(300)	(300)	(300)	(291)	(300)	(298)
Expression	.1998*	.1456	.1946*	.1035	.1008	.0712
Grouping	(301)	(301)	(301)	(292)	(301)	(299)
Recognize	.0852	.1111	.1279	.0632	−.0271	−.0454
Others	(300)	(300)	(300)	(291)	(300)	(298)
MSCEIT E	.1848	.3022*	.2199*	.2016	.1337	−.0403
	(142)	(142)	(142)	(141)	(142)	(142)
MSCEIT I	−.0168	.2112	.1004	.0491	−.0649	.0165
	(140)	(140)	(140)	(139)	(140)	(140)
Cartoon	.0195	.0640	.0931	.1346	−.0114	.0891
Predictions	(141)	(141)	(141)	(140)	(141)	(141)
Missing	.2640*	.1533	.3713*	−.0360	.0725	−.0450
Cartoons	(141)	(141)	(141)	(140)	(141)	(141)
Social	.1875	.1631	.2113	.1769	.1799	.0595
Translations	(140)	(140)	(140)	(139)	(140)	(140)
TMMS	.2120	.1993	.2134*	.1112	.1233	−.0613
Repair	(143)	(143)	(143)	(142)	(143)	(143)
Regulate	.2308*	.0845	.2400*	.0671	.1251	−.1474
Self	(143)	(143)	(143)	(142)	(143)	(143)
Regulate	.0080	.1471	.0359	.1158	.0159	.0245
Others	(143)	(143)	(143)	(142)	(143)	(143)

* $p < .01$.

Table 32 con't

	Form Board	Paper Folding	Surface Develop.	Letter Sets	Figure Classif.	Number Series
Form Board	1.0000 (302)					
Paper Folding	.4905* (302)	1.0000 (302)				
Surface Develop.	.4274* (302)	.4932* (302)	1.0000 (302)			
Letter Series	.2815* (302)	.2766* (302)	.2942* (302)	1.0000 (302)		
Figure Classif.	.3743* (302)	.4324* (302)	.3801* (302)	.3493* (302)	1.0000 (302)	
Number Series	.2895* (302)	.3329* (302)	.3599* (302)	.3765* (302)	.2643* (302)	1.0000 (302)
MSCEIT A	−.0171 (301)	.0709 (301)	.0525 (301)	.2014* (301)	.0281 (301)	.0778 (301)
MSCEIT B	−.0061 (301)	−.0674 (301)	−.0323 (301)	.0305 (301)	.0152 (301)	−.0078 (301)
MSCEIT C	.0500 (301)	.0580 (301)	.1424 (301)	.1663* (301)	.0156 (301)	.1617* (301)
MSCEIT D	.0784 (301)	.0525 (301)	.0976 (301)	.1354 (301)	.0447 (301)	.1486* (301)
MSCEIT F	−.0360 (299)	−.0430 (299)	.0026 (299)	.0479 (299)	−.0040 (299)	−.0260 (299)
MSCEIT G	.0129 (299)	.0149 (299)	−.0233 (299)	.0813 (299)	−.0422 (299)	.0189 (299)
MSCEIT H	.0503 (299)	.0077 (299)	.0894 (299)	.2361* (299)	.1029 (299)	.0728 (299)
MSCEIT J	−.0110 (300)	−.0013 (300)	−.0064 (300)	.0717 (300)	−.0044 (300)	.0200 (300)
MSCEIT K	−.0715 (295)	−.0189 (295)	.0246 (295)	.0961 (295)	−.0367 (295)	.0631 (295)
MSCEIT L	.1829* (292)	.2406* (292)	.1921* (292)	.1581* (292)	.1367 (292)	.2404* (292)
LEAS	.0775 (302)	.1293 (302)	.0106 (302)	.1424 (302)	.1191 (302)	.1172 (302)
DDF	.0168 (300)	.0703 (300)	.0514 (300)	.0949 (300)	.0138 (300)	−.0350 (300)
DIF	.0266 (300)	.0998 (300)	.0703 (300)	.0314 (300)	−.0003 (300)	.0077 (300)
Emotional Appropriat.	.0468 (300)	−.0044 (300)	−.1560* (300)	−.0290 (300)	−.0963 (300)	.0068 (300)
Expression Grouping	.1270 (301)	.1311 (301)	.1110 (301)	.0450 (301)	.0550 (301)	.0735 (301)
Recognize Others	−.0143 (300)	−.0672 (300)	.0520 (300)	.0692 (300)	.0331 (300)	−.0448 (300)

* $p < .01$.

Table 32 con't

	Form Board	Paper Folding	Surface Develop.	Letter Sets	Figure Classif.	Number Series
MSCEIT E	.1775	.1225	.1584	.2267*	.2928*	.1800
	(142)	(142)	(142)	(142)	(142)	(142)
MSCEIT I	.0942	.0083	.0126	.1018	.0550	.1562
	(140)	(140)	(140)	(140)	(140)	(140)
Cartoon	.1469	.2201*	.1129	.1350	.0653	.0494
Predictions	(141)	(141)	(141)	(141)	(141)	(141)
Missing	.0728	.2654*	.1006	.2583*	.1597	.1828
Cartoons	(141)	(141)	(141)	(141)	(141)	(141)
Social	.0155	.0805	.0682	.2797*	.0567	.1739
Translations	(140)	(140)	(140)	(140)	(140)	(140)
TMMS	.1755	.1752	.1003	.1690	.1346	.1286
Repair	(143)	(143)	(143)	(143)	(143)	(143)
Regulate	.1509	.2017	.1843	.1966	.1282	.1233
Self	(143)	(143)	(143)	(143)	(143)	(143)
Regulate	.1189	.0877	.0983	.0928	–.0486	.0404
Others	(143)	(143)	(143)	(143)	(143)	(143)

* $p < .01$.

Table 32 con't

	MSCEIT A	MSCEIT B	MSCEIT C	MSCEIT D	MSCEIT F	MSCEIT G
MSCEIT A	1.0000					
	(302)					
MSCEIT B	.2464*	1.0000				
	(302)	(302)				
MSCEIT C	.1906*	.1417	1.0000			
	(302)	(302)	(302)			
MSCEIT D	.1353	.1402	.3494*	1.0000		
	(302)	(302)	(302)	(302)		
MSCEIT F	.3382*	.3306*	.1866*	.2577*	1.0000	
	(300)	(300)	(300)	(300)	(300)	
MSCEIT G	.1942*	.2646*	.0823	.1194	.3627*	1.0000
	(300)	(300)	(300)	(300)	(300)	(300)
MSCEIT H	.1711*	.0879	.3367*	.3012*	.2170*	.1042
	(300)	(300)	(300)	(300)	(300)	(300)
MSCEIT J	.2047*	.3192*	.1523*	.1815*	.4429*	.2829*
	(301)	(301)	(301)	(301)	(300)	(300)
MSCEIT K	.3048*	.2687*	.1755*	.1135	.2706*	.3434*
	(296)	(296)	(296)	(296)	(296)	(296)
MSCEIT L	.0111	−.0656	.1237	.1375	.0390	−.0084
	(293)	(293)	(293)	(293)	(293)	(293)
LEAS	.1573*	.0025	.1935*	.1631*	.0620	.0553
	(302)	(302)	(302)	(302)	(300)	(300)
DDF	−.0913	−.1099	−.0806	−.0576	−.0908	−.1062
	(300)	(300)	(300)	(300)	(298)	(298)
DIF	−.1097	−.2352*	−.2152*	−.1460	−.2082*	−.1962*
	(300)	(300)	(300)	(300)	(298)	(298)
Emotional	.1207	.1420	.1731*	.0698	.0867	.0271
Appropriat.	(300)	(300)	(300)	(300)	(298)	(298)
Expression	.1596*	.0528	.1323	.0731	.1180	.0543
Grouping	(301)	(301)	(301)	(301)	(299)	(299)
Recognize	.0927	.0652	.0880	.0152	.1255	.1519*
Others	(300)	(300)	(300)	(300)	(298)	(298)
MSCEIT E	.1565	.1134	.1829	.2445*	.1099	.0840
	(143)	(143)	(143)	(143)	(142)	(142)
MSCEIT I	.2034	.1421	.1264	.1323	.0933	.1816
	(141)	(141)	(141)	(141)	(141)	(141)
Cartoon	.0852	.0059	.1235	.0217	.1234	.0848
Predictions	(142)	(142)	(142)	(142)	(141)	(141)
Missing	.0421	.0471	.2215*	.1933	−.0010	.0382
Cartoons	(142)	(142)	(142)	(142)	(141)	(141)
Social	.1567	.0583	.2213*	.1982	.0199	−.0230
Translations	(141)	(141)	(141)	(141)	(140)	(140)
TMMS	.0215	−.0316	.1167	.1263	−.0742	.1166
Repair	(144)	(144)	(144)	(144)	(143)	(143)
Regulate	.0586	−.0374	.0935	.1268	−.0548	.0218
Self	(144)	(144)	(144)	(144)	(143)	(143)
Regulate	.0941	.0633	.0534	.1497	.0222	.1434
Others	(144)	(144)	(144)	(144)	(143)	(143)

* $p < .01$.

Table 32 con't

	MSCEIT H	MSCEIT J	MSCEIT K	MSCEIT L	LEAS	DDF
MSCEIT H	1.0000 (300)					
MSCEIT J	.2677* (300)	1.0000 (301)				
MSCEIT K	.1864* (296)	.3808* (296)	1.0000 (296)			
MSCEIT L	.1377 (293)	.0845 (293)	.0585 (293)	1.0000 (293)		
LEAS	.1351 (300)	.0458 (301)	.0429 (296)	.1015 (293)	1.0000 (303)	
DDF	.0057 (298)	.0019 (299)	−.0801 (294)	.0536 (291)	−.0678 (301)	1.0000 (301)
DIF	−.2267* (298)	−.1536* (299)	−.1421 (294)	.0618 (291)	−.0070 (301)	.5214* (301)
Emotional Appropriat.	.0042 (298)	.1054 (299)	.1070 (294)	.0084 (291)	.0340 (301)	−.0757 (301)
Expression Grouping	.0800 (299)	.1189 (300)	.1526* (295)	.0401 (292)	.1370 (302)	−.0506 (300)
Recognize Others	.1071 (298)	.0257 (299)	.0491 (294)	.0123 (291)	.1370 (301)	−.2777* (301)
MSCEIT E	.1606 (142)	.0664 (142)	.2131 (139)	.1565 (137)	.1773 (143)	−.0995 (143)
MSCEIT I	.0298 (141)	.2620* (141)	.2921* (139)	.1024 (137)	.1827 (141)	−.0970 (141)
Cartoon Predictions	−.0055 (141)	.1385 (141)	.1100 (138)	.0176 (136)	.0643 (142)	.0515 (142)
Missing Cartoons	.1916 (141)	.0662 (141)	.0889 (138)	.2273* (136)	.2036 (142)	.0293 (142)
Social Translations	.2681* (140)	.0348 (140)	.1213 (137)	.0858 (135)	.1204 (141)	−.1456 (141)
TMMS Repair	.0726 (143)	−.0873 (143)	.1153 (140)	.0762 (138)	.1350 (144)	−.3312* (144)
Regulate Self	.0430 (143)	−.0653 (143)	.0630 (140)	.1731 (138)	.1021 (144)	−.2301* (144)
Regulate Others	.1652 (143)	−.0315 (143)	−.0496 (140)	.0047 (138)	.1632 (144)	−.4025* (144)

* $p < .01$.

Table 32 con't

	DIF	EM AP	EX GR	REC O	MSCEIT E	MSCEIT I
DIF	1.0000					
	(301)					
Emotional	−.0816	1.0000				
Appropriat.	(301)	(301)				
Expression	−.0772	.0502	1.0000			
Grouping	(300)	(300)	(302)			
Recognize	−.1705*	−.1146	.0028	1.0000		
Others	(301)	(301)	(300)	(301)		
MSCEIT E	−.0306	−.1087	.1340	.1511	1.0000	
	(143)	(143)	(143)	(143)	(143)	
MSCEIT I	−.0740	.0237	−.1344	.2254*	.2365*	1.0000
	(141)	(141)	(141)	(141)	(141)	(141)
Cartoon	.1258	.0135	.2303*	.0533	.1123	.0448
Predictions	(142)	(142)	(142)	(142)	(142)	(140)
Missing	.0889	−.0132	.1347	.1512	−.0254	−.1108
Cartoons	(142)	(142)	(142)	(142)	(142)	(140)
Social	−.1955	−.0926	.1676	.1034	.0856	.0564
Translations	(141)	(141)	(141)	(141)	(141)	(139)
TMMS	−.3409*	−.1376	.1675	.3748*	.2165*	.0876
Repair	(144)	(144)	(144)	(144)	(142)	(140)
Regulate	−.4060*	−.2938*	.1172	.2596*	.0852	.0177
Self	(144)	(144)	(144)	(144)	(142)	(140)
Regulate	−.3273*	−.0863	−.0775	.6403*	.1403	.1753
Others	(144)	(144)	(144)	(144)	(142)	(140)

* $p < .01$.

Table 32 con't

	CAR PR	MS CAR	SOC TR	Repair	REG S	REG O
Cartoon Predictions	1.0000 (142)					
Missing Cartoons	.3172* (142)	1.0000 (142)				
Social Translations	.2051 (141)	.2894* (141)	1.0000 (141)			
TMMS Repair	.0000 (141)	.0559 (141)	.0981 (140)	1.0000 (144)		
Regulate Self	-.0475 (141)	.0439 (141)	.1069 (140)	.6639* (144)	1.0000 (144)	
Regulate Others	.0145 (141)	.0975 (141)	.0910 (140)	.3720* (144)	.2619* (144)	1.0000 (144)

* $p < .01$.

Note. Sample sizes are given in parentheses.

To prevent excessive numbers of Type 1 errors, each significance test in the above table used a Type 1 error rate of .01. Nonetheless, because 630 tests were used, approximately 6 of these tests can be expected to be significant by chance alone. See the Introduction for the rationale for the Type 1 error rate used.

LEAS = Levels of Emotional Awareness Scale. DDF = TAS-20 Difficulty Describing Feelings. DIF = TAS-20 Difficulty Identifying Feeling scale. EM AP = TEIS Emotional Appropriateness. REC O = TEIS Recognition of Emotion in Others. Regulate Self = TEIS Regulation of Emotion in the Self. Regulate Others = Regulation of Emotion in Others.

The scree plot clearly indicated a one-factor solution. However, there were 2 eigenvalues greater than 1, and the maximum-likelihood significance test indicated that 2 factors were necessary to account for the correlations among the first-order factors. Therefore, both the one- and two-factor solutions were examined. The Harris-Kaiser transformation with c = 0 again resulted in the cleanest solution, with no complex variables and 3 hyperplane coefficients (38% of the coefficients).

Results

First-Order Factor Analysis

First, I factor analyzed the 24 ESI measures and the 12 intelligence tests. The factor pattern coefficient matrix and the matrix of intercorrelations among the factors are given in Table 33. The interpretations of the five factors are explained below.

Emotion Perception

Seven MSCEIT subscales had salient pattern coefficients for this factor. These variables are described in Table 34. Six of these seven subscales were designed to measure Perception of Emotions and Emotional Integration. Therefore this factor was labeled Emotion Perception. As was the case in the dimensional analysis of the 24 ESI variables, the MSCEIT I (Emotion Management) subscale also contributed to this factor.

Fluid Intelligence

Eight variables had salient factor pattern coefficients for this factor. Six of these were intended to measure types of Fluid Intelligence. These were the three tests of Visualization and the three tests of Inductive Reasoning. Two other variables, the TAS-20 Difficulty Identifying Feelings subscale and the OGSI Cartoon Predictions test also had small salient coefficients. The coefficient for the TAS-20 is in the opposite direction than would be expected, indicating that people who have higher Visualization and Inductive Reasoning abilities perceive themselves as having difficulty identifying their feelings. Descriptions of these variables are given in Table 35. Because the variables with the highest coefficients were selected to measure two types of Fluid Intelligence, this factor was labeled Fluid Intelligence.

Self-Reported Emotional Intelligence

Every one of the six self-report measures contributed to this factor (see Table 36). This strongly suggests that this is a method factor. This factor differs from the Perceived Difficulty with Emotions factor found in the dimensional analysis of the 24 cognitive ESI measure, because the last remaining self-report measure contributed to this factor.

Verbal Ability and Emotion Insight

A variety of measures contributed to this factor. These are described in Table 37. The largest contributions were made by the three tests of Verbal Ability. Five of the six Emotional Understanding measures and two of the three Social Insight tests also contributed. This factor had small to moderate correlations with each of the other first-order factors.

The large coefficients for the Verbal Ability tests suggests that this factor could be interpreted as a Verbal Ability factor. However, the contributions of two nonverbal tests—Expression Grouping and Missing Cartoons—make me hesitant to interpret this factor solely as a measure of Verbal Ability. I have therefore labeled it Verbal Ability and Emotion Insight.

Table 33

Primary-Factor Pattern Matrix for First-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Measures, along with the Correlations Among the Primary Factors

	Primary Factor					
Measure	**1**	**2**	**3**	**4**	**5**	**h^2**
Paper Folding	–.01	**.75**	–.00	–.06	–.09	.51
Form Board	.01	**.66**	.07	–.17	.07	.39
Surface Development	–.05	**.64**	.01	–.03	.13	.45
Figure Classification	–.02	**.57**	.02	.01	–.04	.32
Letter Sets	.11	**.50**	–.00	.10	.05	.33
Number Series	.02	**.48**	–.01	.06	.05	.27
Reading	–.14	.00	–.01	**.78**	–.03	.55
Advanced Vocabulary Test	–.20	–.07	.03	**.70**	–.06	.40
Inventive Opposites	–.01	–.08	–.00	**.60**	.11	.36
Rearranged Words	–.08	.13	.04	.16	**.52**	.39
Incomplete Words	.00	.23	–.15	–.09	**.50**	.32
Hidden Words	–.12	.19	–.06	.19	**.42**	.33
MSCEIT J (Designs)	**.63**	.03	–.15	.05	–.02	.41
MSCEIT F (Landscapes)	**.61**	–.05	–.06	.03	.07	.40
MSCEIT K (Sensation Translation)	**.55**	.02	–.01	.09	–.09	.33
MSCEIT G (Facilitation)	**.55**	.06	.13	–.12	–.09	.30
MSCEIT A (Faces)	**.42**	.06	.01	.08	.05	.23
MSCEIT B (Synesthesia)	**.46**	–.09	.00	.06	.03	.25
MSCEIT I (Emotion Management)	**.38**	.12	.14	–.07	–.04	.17
TMMS Repair	–.12	.13	**.70**	.10	–.09	.57
Regulation of Emotion in the Self	–.17	.15	**.63**	.12	–.14	.49
Regulation of Emotion in Others	.08	.05	**.66**	–.11	.04	.43
Recognition of Emotion in Others	.13	–.00	**.56**	.00	–.11	.34
DDF	–.04	.22	**–.55**	–.00	–.22	.38
DIF	–.15	**.28**	**–.54**	–.06	**–.25**	.47
Cartoon Predictions	.17	**.25**	–.13	.10	–.13	.11
MSCEIT C (Blends)	.09	–.11	–.05	**.56**	.16	.37
Missing Cartoons	–.02	.17	–.11	**.52**	**–.35**	.34
MSCEIT D (Progressions)	.16	–.03	.02	**.40**	–.00	.22
Social Translations	–.00	.02	.05	**.37**	.04	.16
MSCEIT H (Transitions)	.17	–.03	–.01	**.36**	.10	.23
MSCEIT L (Analogies)	–.05	.23	–.06	**.30**	–.13	.18
LEAS	.04	.06	.07	**.31**	–.07	.13
Expression Grouping	.05	.07	–.03	**.26**	–.01	.09
Emotional Appropriateness	.15	–.15	–.20	.08	.19	.11
MSCEIT E (Emotions in Relationships)	.16	.22	.12	.17	–.01	.19

Table 33 con't

	Primary Factor				
Primary Factor	**1**	**2**	**3**	**4**	**5**
1	1.00	–.00	.14	.32	.19
2	–.00	1.00	.13	.42	.23
3	.14	.13	1.00	.30	.10
4	.32	.42	.30	1.00	.27
5	.19	.23	.10	.27	1.00

h^2 = Communality. DDF = TAS-20 Difficulty Describing Feelings. DIF = TAS-20 Difficulty Identifying Feelings. LEAS = Levels of Emotional Awareness Scale.

Table 34
Description of the Scales Contributing to Factor 1 (Emotion Perception) in the First-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Measures

Scale	Subscale	Description	Loading
Perception of Emotions			
MSCEIT	Section J Designs	Five graphic designs are rated on each of the seven emotions, (*happiness, sadness, fear, anger, surprise, disgust, excitement*) using the five-point scale.	.63
MSCEIT	Section F Landscapes	Five landscape pictures are rated on each of seven emotions using a five-point scale.	.61
MSCEIT	Section A Faces	Five faces chosen to represent a variety of emotions are each rated on the seven emotions using a five-point scale.	.42
Emotional Integration			
MSCEIT	Section G Facilitation	For each of seven situations, subjects are asked to rate each of five emotions (different for each situation) for their helpfulness. Each emotion is rated on a five-point scale where 1 represents "Definitely Not Useful" and 5 represents "Definitely Useful."	.55
MSCEIT	Section K Sensation Translation	Five complex physical sensations are rated in terms of their similarity to five emotions (different for each item) using a five-point scale where 1 represents "Not Alike" and 5 represents "Very Much Alike."	.55
MSCEIT	Section B Synesthesia	For each of five items, subjects are asked to rate the similarity of a given emotion to five other sensations, including warmth, touch, and color. Each sensation is rated from 1 "Not Alike" to 5 "Very Much Alike."	.46
Management of Emotions in the Self			
MSCEIT	Section I Emotion Management	For each of six emotionally-charged situations, subjects evaluate the effectiveness of five possible actions, using a five-point rating scale where 1 represents "Very ineffective" and 5 represents "Very effective."	.38

Table 35
Description of the Scales Contributing to Factor 2 (Fluid Intelligence) in the First-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Measures

Scale	Subscale	Description	Loading
Visualization			
Paper Folding		For each item, successive drawings illustrate two or three folds made in a square sheet of paper, with the final drawing showing where a hole is punched. The participant is asked to indicate which of five drawings shows how the punched sheet will appear when unfolded.	.75
Form Board		Each item presents 5 pieces, some or all of which can be put together to form a figure presented in outline form. The participant is asked to indicate which of the pieces, when fitted together, would form the outline.	.66
Surface Development		Drawings are given of three-dimensional forms that can be made with paper. With each is a diagram showing how a piece of paper might be cut and folded to make the form. The participant is asked to indicate correspondences between the diagram and the three-dimensional form.	.64
Inductive Reasoning			
Figure Classification		Each item presents 2 or 3 groups of geometrical figures. The participant is asked to discover the rule that governs group membership, and then apply this rule to a second line of figures.	.57
Letter Sets		Five sets of four letters are presented. The participant is asked to find the rule that relates four of the sets to each other, and then to mark the one that does not fit the rule.	.50
Number Series		For each item, the participant is asked to provide two missing numbers in a series of six to nine numbers.	.48
Emotional Understanding			
TAS-20	Difficulty Identifying Feelings	A 7-item likert-type scale. Two of the items are "I am often confused about what emotion I am feeling" and "I have feelings that I can't quite identify."	.28
Social Insight			
OGSI	Cartoon Predictions	This is a test of the ability to predict behaviour consequences. For each item, a cartoon depicts an interpersonal situation. The subject must choose one of three alternative cartoons to show what is most likely to happen next.	.25

Table 36
Description of the Scales Contributing to Factor 3 (Self-Reported Emotional Intelligence) in the First-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Measures

Scale	Subscale	Description	Loading
Regulation of Emotion in the Self			
TEIS	Regulation of Emotion in the Self	A 12-item likert-type scale of the ability to control one's feelings. Two example items are "I can keep myself calm even in highly stressful situations" and "I think my biggest problem is my inability to control my emotions" (reverse-scored). Six items are reverse-scored.	.63
TMMS	Repair	A 6-item likert-type scale of the ability to regulate one's emotions. Two example items are "Although I am sometimes sad, I have a mostly optimistic outlook" and "I try to think good thoughts no matter how badly I feel."	.70
Regulation of Emotion in Others			
TEIS	Regulation of Emotion in Others	A 12-item likert-type scale of the ability to influence others' emotions. Two example items are "Usually, I know what it takes to turn someone else's boredom into excitement" and "I don't think I'm very good at persuading other people" (reverse-scored). Six items are reverse-scored.	.66
Recognition of Emotion in Others			
TEIS	Recognition of Emotion in Others	A 12-item likert-type self-report scale of the ability to detect and understand others' feelings. Two example items are " I am good at "reading" the inner feelings of others even if I don't know them very well" and "I am often not the best judge of character" (reverse-scored). Six items are reverse-scored.	.56
Emotional Understanding			
TAS-20	Difficulty Identifying Feelings	A 7-item likert-type scale. Two of the items are "I am often confused about what emotion I am feeling" and "I have feelings that I can't quite identify."	–.55
TAS-20	Difficulty Describing Feelings	A 5-item likert-type scale. Two of the items are "It is difficult for me to find the right words for my feelings" and "I find it hard t describe how I feel about people." One item is reverse-scored.	–.54

Table 37

Description of the Scales Contributing to Factor 4 (Verbal Ability and Emotion Insight) in the First-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Measures

Scale	Subscale	Description	Loading
Verbal Ability			
Reading I		The participant is asked to mark two out of four possible responses that are similar in meaning to the given proverb.	.78
Advanced Vocabulary Test		This is a five-choice synonym test consisting mainly of difficult items.	.70
Inventive Opposites		The participant is asked to complete two words that are opposite in meaning from a given word, given the first letter of each of the answers.	.60
Emotional Understanding			
MSCEIT	Section C Blends	Thirteen multiple-choice items assess the ability to analyze blended or complex emotions.	.56
MSCEIT	Section D Progressions	Twelve multiple-choice items assess understanding of how emotional reactions proceed over time, with an emphasis on intensification of feelings.	.40
MSCEIT	Section H Transitions	Twelve passages assess understanding of how emotions change as situations change. For each, two emotions are given in the item stem. The subject must choose the situation (from five alternatives) that accounts for the change in emotions.	.36
Levels of Emotional Awareness Scale		Subjects report how they would feel in each of five emotionally-evocative situations. They also describe how the other person would feel. Responses are scored based on the complexity and number of emotion words used.	.31
MSCEIT	Section L Analogies	For each of twelve items, an analogy between two emotions is given. Five possible emotion analogies are given as responses. Subjects choose the analogy that captures the same relation as the analogy given.	.30
Social Insight			
OGSI	Missing Cartoons	This test measures understanding of behaviour relationships. Each item presents a series of four cartoons that tells a story. One of these cartoons is missing, and must be selected from among a set of four alternatives.	.52
OGSI	Social Translations	This test measures the ability to recognize changes in behavioural meaning based on context. The subject is given a verbal statement that is exchanged between two people. The subject must then choose one of three alternative pairs of people between whom the same verbal statement would have a different meaning.	.37
Recognition of Emotion in Others			
OGSI	Expression Grouping	This test measures the ability to abstract common attributes from behaviour or expressive stimuli. Each item consists of a group of three line drawings of facial expressions, hand gestures, and body postures that show some thought, feeling or intention. Subjects select one of four alternative drawings of expressions that belong with the given group of expressions.	.26

Verbal Closure

Each of the three tests of Verbal Closure had salient coefficients for this factor. In addition, the TAS-20 Difficulty Identifying Feelings subscale loaded in the expected direction (indicating that the ability to identify emotions is associated with higher Verbal Closure), and the Missing Cartoons test loaded in the unexpected direction (indicating that greater Social Insight is associated with lower Verbal Closure). This factor is labeled Verbal Closure. See Table 38.

Second-Order Factor Analysis

Both the one- and two-factor solutions were examined. The one-factor pattern matrix is given in Table 39. Each of the first-order factors contributed to this second-order factor. I therefore interpret this higher-order factor as "g", which suggests that each of the first-order factors, including the two factors that had contributions from only the ESI measures, are Primary Mental Abilities. It is interesting to note, however, that both Emotion Perception and Self-Reported Emotional Intelligence had low loadings on the second-order factor and have low communalities. In contrast, the Verbal Ability and Emotion Insight factor had a very high pattern coefficient and a high communality.

The two-factor pattern matrix is given in Table 40. The second factor had only a single salient factor pattern coefficient. This was the coefficient for the second first-order factor, which I labeled Fluid Intelligence. This coefficient was very large (.98), and no other variables had coefficients that neared salience. This second-order factor is therefore also labeled Fluid Intelligence. The other second-order factor had salient coefficients for each of the remaining first-order factors, and is labeled Crystallized Intelligence. Self-Reported Emotional Intelligence had a rather low pattern coefficient and a low communality.

This finding is somewhat in conflict with the results of the dimensional analysis of the 24 cognitive measures of ESI. Those results showed that that Emotion Perception factor did not have a salient coefficient on the higher-order factor. It could be that the presence of lower-order factors that were closely associated with Neuroticism and Extraversion, in that solution, influenced the nature of the higher-order factor that emerged. Further research is needed to determine the degree of relation between Emotion Perception and higher-order constructs.

These findings are also somewhat in conflict with the analysis presented in the last chapter, which examined the relation of ESI to cognitive and personality composites. In that analysis, there was no evidence that either Emotion Perception or Perceived Difficulty with Emotions measure cognitive abilities, and most self-report measures of ESI appeared to measure personality dimensions. It is therefore informative to recognize that the Self-Reported Emotional Intelligence factor had low communalities in both the one- and two-factor second-order analyses reported here.

Conclusions

Summary

In my first-order factor analysis of the 24 measures of ESI and the 12 intelligence tests, I found five factors: (a) Emotion Perception, (b) Fluid Intelligence, (c) Self-Reported Emotional Intelligence, (d) Verbal Ability and Emotion Insight, and (e) Verbal Closure. In the second-order factor analysis, two factors emerged: Fluid Intelligence (which was marked by the first-order Fluid Intelligence factor), and Crystallized Intelligence (which was marked by the remaining first-order factors). These two second-order factors had an intercorrelation of .40.

Table 38

Description of the Scales Contributing to Factor 5 (Verbal Closure) in the First-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Measures

Scale	Subscale	Description	Loading
Verbal Closure			
Rearranged Words		For each item, the participant is asked to write a common English word from a group of five scrambled letters. Modeled after the test by Ekstrom, French, and Harman (1976) that uses four-letter words.	.52
Incomplete Words		The participant is asked to provide one or more letters to complete common words.	.50
Hidden Words		The participant is asked to find and circle one or more four-letter words in apparently random lines of letters.	.42
Social Insight			
OGSI	Missing Cartoons	This test measures understanding of behaviour relationships. Each item presents a series of four cartoons that tells a story. One of these cartoons is missing, and must be selected from among a set of four alternatives.	–.35
Emotional Understanding			
TAS-20	Difficulty Identifying Feelings	A 7-item likert-type scale. Two of the items are "I am often confused about what emotion I am feeling" and "I have feelings that I can't quite identify."	–.25

Table 39
Pattern Matrix for the Second-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Variables, One-Factor Solution

First-Order Factor	Factor Label	Second-Order Factor	
		1	h^2
1	Emotion Perception	**.32**	.11
2	Fluid Intelligence	**.43**	.18
3	Self-Reported Emotional Intelligence	**.33**	.11
4	Verbal Ability and Emotion Insight	**.92**	.84
5	Verbal Closure	**.36**	.13

h^2 = Communality.

Table 40

Pattern Matrix for the Second-Order Factor Analysis of the 12 Intelligence Tests and the 24 Cognitive ESI Variables, Two-Factor Solution

First-Order Factor	Factor Label	Second-Order Factor 1	Second-Order Factor 2	h^2
1	Emotion Perception	**.54**	–.23	.25
2	Fluid Intelligence	.04	**.98**	1.00
3	Self-Reported Emotional Intelligence	**.36**	–.02	.12
4	Verbal Ability and Emotion Insight	**.74**	.10	.62
5	Verbal Closure	**.33**	.07	.13

First-Order Factor	Second-Order Factor 1	Second-Order Factor 2
1	1.00	.40
2	.40	1.00

h^2 = Communality.

Relation of These Results to My Original Hypotheses

Originally, I hypothesized that each of the measures of the cognitive subcomponents of ESI taps a cognitive ability, and that they are related to Crystallized Intelligence. From this analysis, it would appear that this hypothesis is correct. However, examining all of the evidence from the analyses undertaken so far produces a more complete picture.

ESI measures contributed to three factors in the combined factor analysis of ESI measures and intelligence tests. Therefore, there are three possible Primary Mental Abilities to be considered. The first of these is Emotion Perception. This factor emerged in both this factor analysis and the factor analysis of the cognitive ESI variables in Chapter 2. This factor did not demonstrate convergent validity with other types of intelligence in the last chapter. This first-order factor did have salient loadings on the higher-order factors found in this chapter, but its communality was not high in either analysis. It therefore appears that Emotion Perception may be a new Primary Mental Ability that is only weakly related to Verbal Ability and to other aspects of ESI.

Emotion Insight may also represent a Primary Mental Ability: these measures formed coherent factors in both factor analyses, and the factors that they loaded on had salient coefficients in both of the higher-order analyses. However, in the last chapter I demonstrated that the Emotion Insight factor had moderate correlations with Verbal Ability, and here I have demonstrated that these tests load on the same factor as Verbal Ability measures. While I am hesitant to label pictorially-presented tests (Expression Grouping and Missing Cartoons) as Verbal Ability measures, I must acknowledge that the Emotion Insight measures appear to overlap with Verbal Ability to a large extent. Further research on the relation of Emotional Understanding and Social Insight to Verbal Ability is needed and future test development efforts should strive to create measures that are less correlated with Verbal Ability.

Self-report measures of Emotional Intelligence formed a coherent first-order factor here, and most of these measures formed a coherent factor in the dimensional analysis of cognitive ESI measures. In addition, these first-order factors contributed to the second-order factors in both analyses. These pieces of evidence suggest that Self-Reported Emotional Intelligence should be interpreted as a new Primary Mental Ability. However, the primary distinction between these measures and the other ESI measures is methodological, not conceptual. As well, in the previous chapter, I failed to find evidence of convergent validity between Perceived Difficulty with Emotions and other types of intelligence. Instead, factor scores and most of these subscales appeared to measure personality dimensions. These findings do not, therefore, provide consistent and compelling evidence that these tests or either of these two (very similar) factors measure a new Primary Mental Ability. Further research is needed. One limitation of the current research design was its exclusive use of maximum-performance tests of intelligence. If future research were to use a multi-trait multi-method approach, wherein each construct is measured with both maximum-performance and self-report methods, the influence of measurement method could be better assessed.

Relation of the Results to Previous Research

The reader may recall that very little previous research has addressed this question. One article that did address this is Horn (1998). He claimed that Behavioural Relations (the ability to make judgement about how people interact and behave and the ability to estimate others' feelings—a combination of Social Insight and Recognizing Emotions in Others in my terminology) loads on Crystallized Intelligence. This claim, which was based on single 20-

item measure from an old version of the Kit of Factor-Referenced Cognitive Tests (John Horn, personal communication, 1999), agrees with my results: I found that measures of Social Insight and the Ability to Recognize Emotion in Others were more strongly related to Crystallized Intelligence than Fluid Intelligence.

Final Word

In conclusion, there was clear evidence for only one new Primary Mental Ability—Emotion Perception. This Primary Mental Ability appeared to be most closely related to Crystallized Intelligence. Emotion Insight also represents a Primary Mental Ability but in this data set it was closely associated with Verbal Ability. Further research is needed to demonstrate that these tasks represent a distinct Primary Mental Ability, and not just new measures of Verbal Ability. There is insufficient evidence that Self-Reported Emotional Intelligence represents a Primary Mental Ability, even though these measures consistently formed a first-order factor, because these measures appear to tap personality dimensions, not cognitive abilities. Finally, the reader is reminded that not all aspects of ESI were measured in this study (I only included 14 subcomponents), and other Primary Mental Abilities related to emotions or social activities may exist.

CHAPTER 5: RELATION OF EMOTIONAL AND SOCIAL INTELLIGENCE TO THE BIG FIVE DIMENSIONS OF PERSONALITY

Background

For ESI subcomponents that are personality dimensions, it is important to understand their relations to well-known and accepted dimensions of personality. Many researchers argue that the majority of personality dimensions can be fit into a hierarchical structure known as the Big Five model of personality. At the highest level of this model are the Big Five dimensions: Extraversion, Conscientiousness, Agreeableness, Neuroticism (or its opposite Emotional Stability), and Openness (or Intellect). Quite a variety of content fits within each of these five domains. This content can therefore be divided into smaller clusters, usually called facets. Assertiveness, Gregariousness, and Activity Level, for example, are facets that fall within the domain of Extraversion (Goldberg, 1999b). Facets can be identified rationally (see, e.g., Costa & McCrae, 1992) or by conducting a factor analysis within each of the Big Five domains (see, e.g., Saucier & Ostendorf, 1999).

The Big Five model of personality is not a hierarchical model in the way that the hierarchical model of cognitive abilities is. The latter model was developed using hierarchical factor analysis, first conducting factor analyses of individual measures, and then conducting factor analyses of the first-order factors to obtain the second- (and third-) order factors. The Big Five model of personality was developed in reverse—first researchers discovered the higher-order constructs, and now they are searching for the lower-order constructs. Because of this, the lower-order constructs in the Big Five model—the facets—do not have as strong evidence of construct validity as the lower-order constructs in the cognitive model—Primary Mental Abilities. Despite this limitation, if a number of facets are measured, it is possible to clearly mark the Big Five dimensions, so that the relations of ESI measures to the Big Five can be determined.

Research on the Relation of ESI Subcomponents to the Big Five

This section will review the research on the relation of ESI subcomponents to the Big Five.

Positive Expressivity and Negative Expressivity

Only one instrument currently distinguishes between Positive Expressivity and Negative Expressivity: the Gross and John (1999) Expressivity Scale. These authors found that Positive Expressivity correlated .58 with Extraversion and .36 with Openness to Experience, and Negative Expressivity correlated .47 with Neuroticism and .27 with Extraversion. From this research, it appears that Positive Expressivity is most closely associated with Extraversion, while Negative Expressivity is most closely associated with Neuroticism.

Attending to Emotions

Salovey et al. (1995) explored the relation of the subscales of the TMMS to the Neuroticism subscale of the Eysenck Personality Inventory (EPI; Eysenck, 1973), using a sample of 78 students. They found that the Attention subscale correlated .22 with Neuroticism. Other correlations with the EPI are not reported.

Davies et al. (1998) examined the relation of Attending to Emotions to the Big Five dimensions in two of their studies. In their second study, they found small and non-significant correlations between the TMMS Attention subscale and each of the three subscales of the EPI: Psychoticism, $r = .01$; Extraversion, $r = .12$, Neuroticism, $r = .18$. In

their third study, they found that the TMMS Attention subscale had a substantial loading on the Agreeableness factor (loading = .65).

From these three studies, therefore, it appears that Attending to Emotions may have a small relation with Neuroticism, but be most closely associated with Agreeableness.

Emotional Understanding

As discussed in Chapter 3, previous research with the TAS-20 and the TMMS Clarity subscale showed that self-report measures of Emotional Understanding are most strongly related to Neuroticism and Extraversion.

Managing Emotions in the Self

Davies et al. (1998) found that the TMMS Repair subscale (which measures Managing Emotions in the Self) had salient pattern coefficients for both the Neuroticism factor (loading = –.39) and the Agreeableness factor (loading = .32).

Remaining Subcomponents of ESI

I could find no research that explored the relation between the Big Five and the remaining subcomponents. There are likely three reasons for this.

First, some of these constructs appear to be relatively new variables. For example, I only know of one instrument that assesses Emotion-Based Decision-Making—the TEIS Flexible Planning subscale—and little research has been done with this instrument.

Second, some variables have been measured for years, but only as part of larger constructs. For example, Responsive Joy, Responsive Distress, and Empathic Concern are all aspects of Empathy, but researchers have not usually distinguished between them. Because of this, although there is research on the relation of Empathy to the Big Five dimensions of personality, measurement of these three concepts is confounded with each other and with other concepts. Two instruments—the Quick Scale of Empathy (QSE) and the Interpersonal Reactivity Index (IRI)—provide clear measurement of these subcomponents (the QSE measures each of these three subcomponents, and the IRI provides clear measurement of Empathic Concern). However, I could find no research on the relation of either of these to the Big Five dimensions of personality.

Third, researchers may be less interested in the relation of cognitive aspects of ESI to the Big Five.

General Measures of Emotional Intelligence

Lastly, research on the relations between Emotional Intelligence measures and the Big Five has been conducted using both the EQ-i (Bar-On, 1997b) and the 33EI (Schutte et al., 1998). Both of these self-report instruments appear to measure personality subcomponents of ESI to some extent. Bar-On (1997b) found that total scores on the EQ-i correlated moderately with Neuroticism (r = –.36), and Schutte et al. (1998) found that the 33EI correlated strongly with Openness (r = .54).

Summary

The relations between self-report ESI measures and the Big Five have been explored for both personality and cognitive subcomponents. From this research, it appears that ESI subcomponents may be related to any of the Big Five dimensions, and that examination of individual measures is needed. However, relations with the Big Five have only been explored for some of the personality subcomponents of ESI, and often only two or three of the Big Five dimensions were included in the studies. For many of the ESI subcomponents, their relations with the Big Five do not appear to have been studied at all.

Research Question

Based on this literature review, I conclude that some measures of ESI have been shown to be related to some Big Five dimensions, most frequently Neuroticism, Extraversion, and Openness. However, the relations of most ESI measures to the Big Five have not been examined. This leads to the following research question:

> How are personality subcomponents of ESI related to the Big Five dimensions of personality?

Future research could explore the relation of cognitive subcomponents of ESI to the Big Five.

Research Approach

Two approaches could have been used to examine the relation of personality subcomponents of ESI to the Big Five dimensions. First, I could have correlated these ESI measures with each of the Big Five dimensions. I did this in chapter 3 using the UBC Student Sample. The second approach would be to conduct a factor analysis of the ESI components and a number of measures of each of the Big Five dimensions. This latter approach was followed here.

Hypotheses

Based on previous research, I hypothesized that Positive Expressivity is most closely related to Extraversion, that Negative Expressivity is most closely related to Neuroticism, and that Attending to Emotions is most closely associated with Agreeableness. I did not hypothesize any particular relation between the other four personality subcomponents and the Big Five.

Method

Participants: The Eugene-Springfield Community Sample

With the generous assistance of Dr. Lewis Goldberg of the Oregon Research Institute, I was able to administer my seven personality scales to the Eugene-Springfield Community Sample. This is a group of approximately 800 residents in the Eugene-Springfield area of Oregon, who have been completing mailed questionnaire packages for the last 5 – 10 years. By administering my items to this sample, I was able to examine the relation of my scales to other measures that have already been administered to this sample. However, because different questionnaires were completed at different times, sample sizes vary.

The seven ESI personality scales were administered to this sample during February, 2000. The completed data from this and a number of previously-completed measures were forwarded to me in late December 2000.

Measures

Seven Personality Dimensions of ESI

Participants in the Eugene-Springfield Community Sample had previously completed a large number of personality items (1,412 of them), referred to as the International Personality Item Pool (IPIP). In order to facilitate the administration of my scales to this sample, I created new 10-item public-domain measures to assess the seven personality subcomponents of ESI (see Appendix B). I wrote each item in IPIP format (a short declarative statement that could be proceeded by the word "I"; for example "Enjoy meeting new people"), and used existing IPIP items wherever possible. The scales are the Positive Expressivity Scale, the Negative Expressivity Scale, Attending to Emotions, Emotion-Based Decision-Making, Responsive Joy, Responsive Distress, and Empathic Concern. The reader will recall that I wrote measures of Positive Expressivity and Negative Expressivity for

administration to the UBC Student Sample as well. There were some minor variations in the item-wording between the two samples. Because existing IPIP items were used where possible, not all items were answered by the same numbers of participants. In calculating scale scores for use in subsequent analyses, all available data were used.

The Big Five Dimensions of Personality

The NEO-PI-R (Costa & McCrae, 1992) results in 30 facet scores as well as scores for each of the Big Five dimensions. Each facet is measured with 8-items, and dimension scores are the sum of the scores on the six subordinate facets. The NEO-PI-R was previously administered to the Eugene-Springfield Community sample, and item and scale level data were forwarded to me.

Demographic Information

Data were obtained on the sex, age, ethnicity, education, and employment of participants.

Data Screening

Upon the advice of the data analyst at the Oregon Research Institute (who was acting upon the advice of the publishers of the NEO-PI-R), I omitted those participants who obtained unacceptable responses to the validity indicators on the NEO-PI-R (two questions at the end of the inventory that ask if subjects have responded honestly). This resulted in the omission of 4 participants.

Final Sample

The final sample consisted of 781 people (415 women, 305 men, 61 unspecified). Ages ranged from 18 to 85, with a mean of 52 and standard deviation of 13. This sample was fairly well educated: only 1.1% of the sample had not completed high school; 9.8% had completed high school; 34% had attended vocational or technical institutions or had completed some college; and 54.8% had completed college or gone beyond college. This sample included people in a variety of employment situations: 42% were employed full time, and 15.4% part time; 22% were retired; 9.3% were homemakers; and 2.4% were unemployed. The vast majority of respondents (88.5% of the sample and 98% of people who responded to this question) identified themselves as Caucasian.

Descriptive Statistics

Descriptive statistics for each of the variables I used are given in Table 41, for men and women separately. For each variable, the means for men and women were compared using One-Way ANOVA's. The variances were compared using the Bartlett-Box F-test (Box, 1953). Where the means or variances were significantly different, this is indicated in Table 41.

Reliability

The internal consistencies for each of the measures used are given in Tables 42, 43, and 44 below. From these tables, it is clear that each of these measures has acceptable levels of internal consistency.

Data Analysis

Measures of the seven personality subcomponents were combined with measures of the 30 facets of the NEO-PI-R in a single factor analysis, to determine the relations of the personality subcomponents to the Big Five dimensions of personality.

Table 41
Descriptive Statistics for Each of the Measures in the Eugene-Springfield Community Sample

Variable	Sex	Sample Size	Mean	Std Dev	Skewness
Personality Subcomponents of ESI					
Positive Expressivity	Male	288	3.57*	.62	–.54
	Female	403	3.98*	.62	–.95
Negative Expressivity	Male	280	2.98*	.60	.33
	Female	394	3.25*	.65	–.03
Attending to Emotions	Male	288	3.46*	.67	–.15
	Female	403	3.73*	.65	–.13
Emotion–Based Decision–Making	Male	288	2.71*	.49	.22
	Female	403	2.97*	.50	.20
Responsive Joy	Male	280	3.74*	.47	–.27
	Female	394	4.06*	.51	–.42
Responsive Distress	Male	288	3.08*	.56	.15
	Female	403	3.52*	.54	–.18
Empathic Concern	Male	288	3.42*	.73	–.18
	Female	403	3.73*	.61	–.55
Personality Composites					
Neuroticism	Male	275	76.64*	22.54	.57
	Female	384	81.56*	23.49	.43
Extraversion	Male	275	105.59	19.65	–.08
	Female	384	106.72	20.26	–.21
Openness	Male	275	110.83*	20.14	–.05
	Female	384	115.53*	21.66	–.09
Agreeableness	Male	275	118.78*	17.86*	–.45
	Female	384	129.57*	15.40*	–.25
Conscientiousness	Male	275	124.20	17.59	–.29
	Female	384	123.89	19.61	–.40

* $p < .01$.

Table 41 con't

Variable	Sex	Sample Size	Mean	Std Dev	Skewness
Personality Facets					
N1 Anxiety	Male	275	13.61*	5.26	.13
	Female	384	15.23*	5.73	.24
N2 Angry Hostility	Male	275	12.23	5.09	.68
	Female	384	11.89	4.87	.57
N3 Depression	Male	275	11.88	5.44	.69
	Female	384	12.83	6.13	.56
N4 Self–consciousness	Male	275	13.95*	4.81	.62
	Female	384	14.97*	5.13	.22
N5 Impulsiveness	Male	275	16.08	4.34	.01
	Female	384	16.45	4.85	–.11
N6 Vulnerability	Male	275	8.90*	4.04	.51
	Female	384	10.19*	4.45	.76
E1 Warmth	Male	275	21.40*	4.61	–.61
	Female	384	23.47*	4.18	–.66
E2 Gregariousness	Male	275	14.13	5.52	.04
	Female	384	15.13	5.57	–.19
E3 Assertiveness	Male	275	16.39	5.06	–.10
	Female	384	15.67	5.31	–.12
E4 Activity	Male	275	17.64	4.79	.00
	Female	384	17.67	4.91	–.13
E5 Excitement-seeking	Male	275	16.56*	4.56	–.04
	Female	384	14.08*	5.00	.05
E6 Positive Emotions	Male	275	19.46*	5.15	–.45
	Female	384	20.69*	5.08	–.49

* $p < .01$.

Table 41 con't

Variable	Sex	Sample Size	Mean	Std Dev	Skewness
O1 Fantasy	Male	275	18.42	4.89	.25
	Female	384	17.69	5.60	–.05
O2 Aesthetics	Male	275	17.07*	6.05	–.10
	Female	384	19.60*	5.84	–.38
O3 Feelings	Male	275	20.33*	4.24	.13
	Female	384	21.97*	4.12	–.32
O4 Actions	Male	275	15.00*	3.93	.18
	Female	384	16.55*	4.11	–.04
O5 Ideas	Male	275	19.63	5.52	–.36
	Female	384	18.96	5.69	–.20
O6 Values	Male	275	20.38	4.89	–.58
	Female	384	20.76	5.30	–.73
A1 Trust	Male	275	20.93*	4.55	–1.02
	Female	384	22.11*	4.56	–1.08
A2 Straightforwardness	Male	275	20.81*	4.83*	–.37
	Female	384	22.94*	4.14*	–.31
A3 Altruism	Male	275	22.71*	3.54	–.21
	Female	384	24.38*	3.43	–.35
A4 Compliance	Male	275	18.39*	4.54	–.37
	Female	384	20.21*	4.35	–.37
A5 Modesty	Male	275	17.08*	4.63	.06
	Female	384	19.21*	4.46	–.17
A6 Tender-Mindedness	Male	275	18.87*	3.97*	–.32
	Female	384	20.72*	3.39*	.06

* $p < .01$.

Table 41 con't

Variable	Sex	Sample Size	Mean	Std Dev	Skewness
C1	Male	275	23.25	3.56	–.47
Competence	Female	384	22.99	3.68	–.35
C2	Male	275	18.56	4.19*	–.28
Order	Female	384	18.78	5.26*	–.48
C3	Male	275	23.92	3.78	–.45
Dutifulness	Female	384	24.30	3.87	–.53
C4	Male	275	18.90	4.66	–.21
Achievement-striving	Female	384	18.45	4.34	–.28
C5	Male	275	21.43	4.21	–.56
Self-discipline	Female	384	21.25	4.72	–.55
C6	Male	275	18.15	4.11	–.20
Deliberation	Female	384	18.12	4.12	.05

* $p < .01$.

Note. Means for men and women were compared using one-way ANOVA's. Asterisks next to the means indicate that they were significantly different. The variances for men and women were compared using the Bartlett-Box F-test (Box 1953). Asterisks next to the standard deviations indicate that the variances were significantly different. These means and standard deviations and the comparisons of these for men and women are given for descriptive purposes only. However, to prevent escalating Type 1 error rates, differences are only noted as significant if $p < .01$. Nonetheless, because there are 74 significance tests in the above table, one (or perhaps two) of these comparisons was likely significant by chance. See pages 32 – 37 of the Introduction for the rationale for this Type 1 error rate.

Table 42
Internal Consistencies of the Seven Personality Scales of ESI in the Eugene-Springfield Community Sample

Scale	**Coefficient Alpha**
Positive Expressivity	.80
Negative Expressivity	.75
Attending to Emotions	.82
Emotion-Based Decision-Making	.69
Responsive Joy	.74
Responsive Distress	.68
Empathic Concern	.75

Table 43
Internal Consistencies of the 30 NEO-PI-R facets in the Eugene-Springfield Community Sample

	Scale	Coefficient Alpha
N1	Anxiety	.83
N2	Angry Hostility	.80
N3	Depression	.84
N4	Self-Consciousness	.74
N5	Impulsiveness	.72
N6	Vulnerability	.80
E1	Warmth	.80
E2	Gregariousness	.80
E3	Assertiveness	.79
E4	Activity	.74
E5	Excitement-Seeking	.63
E6	Positive Emotions	.81
O1	Fantasy	.81
O2	Aesthetics	.83
O3	Feelings	.74
O4	Actions	.63
O5	Ideas	.82
O6	Values	.79
A1	Trust	.84
A2	Straightforwardness	.74
A3	Altruism	.72
A4	Compliance	.72
A5	Modesty	.75
A6	Tender-Mindedness	.58
C1	Competence	.70
C2	Order	.74
C3	Dutifulness	.66
C4	Achievement Striving	.66
C5	Self-Discipline	.78
C6	Deliberation	.70

Table 44
Internal Consistencies of the Five Domain Scores of the NEO-PI-R in the Eugene-Springfield Community Sample

Scale	Coefficient Alpha
Neuroticism	.94
Extraversion	.91
Openness	.92
Agreeableness	.90
Conscientiousness	.91

Testing Assumptions: Determining if Men and Women Should be Analyzed Together

Mean Differences

There were significant differences in the means for men and women (Hotelling's (1931) $T^2 = .534$, $F(37, 581) = 8.38$, $p < .01$). Therefore, if men and women were combined in a single analysis, the data would need to be mean-deviated within sex first.

Differences in the Variance-Covariance Matrices

A combined analysis of the data from men and women would be allowable if the variance-covariance matrices for men and women were equal. These variance-covariance matrices were compared using Box's M (1949) and were found to be unequal (M = 1045.3, Chi-Square (703 DF) = 978.9, $p < .001$), and therefore separate analyses were done using the 305 men and the 415 women. The results of these analyses were then compared to determine if any general conclusions could be made about the relation of personality subcomponents of ESI to the Big Five dimensions.

Number of Factors

The correlations among the seven personality aspects of ESI and the 30 NEO-PI-R facets were calculated using pairwise deletion. The correlations among these 37 variables are given separately for men and women in Table 45.

For both men and women, the scree plot suggested 7 factors. For men, there were 8 eigenvalues greater than 1; while for women there were 7 eigenvalues greater than 1. The maximum likelihood criterion suggested 14 factors for men, and 15 for women. Given the similarity of the scree plot results and the eigenvalue greater than 1 criterion, 7 factors were extracted for both men and women.

Transformation

For both men and women, three different Harris-Kaiser transformations of the seven-factor solution were examined. For both men and women, the best transformations were the ones with c = .50. For men, this transformation resulted in a pattern matrix with 18 complex variables, and 115 hyperplane coefficients (44% of the coefficients). For women, this transformation had 20 complex variables, and 120 hyperplane coefficients (46% of the coefficients).

Results

Seven factors were extracted for men and women. The primary-factor pattern matrices and matrices of intercorrelations for men and women are given in Tables 46 and 47, respectively. For men, six of the seven ESI variables loaded together on a strong ESI factor. The remaining variable (Empathic Concern) had its only salient pattern coefficient on a factor marked by the six Agreeableness facets. There were also clear factors for Neuroticism, Conscientiousness, and Openness, as well as two factors with salient factor pattern coefficients for the Extraversion facets. For women, the same six ESI variables loaded together on a strong ESI factor. Again, the remaining variable (Empathic Concern) had its only salient pattern coefficient for a factor that was primarily marked by Agreeableness facets. There were clear factors for Conscientiousness, Neuroticism, and Openness, as well as two factors that were marked by both Agreeableness and Extraversion facets. For both men and women, E1 (Gregariousness) and O3 (Feelings) also had salient pattern coefficients for this factor. I labeled this factor Sensitivity. People who score high on this dimension would be described as Sensitive, while those who score low would be described as Insensitive.

Table 45
Correlations Among the Seven Personality Aspects of ESI and the 30 NEO Facets, for Men and Women Separately

	PES	NES	Attend.	EBDM	Res Joy	Res Dis	Em Con
PES	1.0000	.4014*	.3255*	.2178*	.5319*	.2856*	.2081*
NES	.4261*	1.0000	.2530*	.0931	.2265*	.2461*	–.0180
ATTEND	.3484*	.3753*	1.0000	.3373*	.2679*	.2699*	.1839*
EBDM	.2726*	.1890*	.3903*	1.0000	.2322*	.1769*	.1628*
RES JOY	.5240*	.2546*	.2197*	.1692*	1.0000	.2329*	.2213*
RES DIS	.2520*	.2680*	.2292*	.1811*	.2919*	1.0000	.3942*
EM CON	.2202*	.1083	.2128*	.2013*	.2401*	.2962*	1.0000
N1	–.0301	.1095	.2099*	.1396*	–.0020	.2990*	–.0240
N2	.0147	.3133*	.1932*	.1916*	–.0978	.1706*	–.1637*
N3	–.0750	–.0144	.1168	.1429*	–.0401	.2112*	–.0242
N4	–.1951*	–.0753	–.0354	–.0162	–.1482*	.2111*	–.1463*
N5	.1033	.2686*	.1268	.2681*	.1261	.3199*	.0378
N6	.0095	.0817	.1204	.2097*	–.0604	.3326*	–.0283
E1	.4703*	.2764*	.2445*	.1773*	.4884*	.2265*	.2559*
E2	.2639*	.2602*	.1054	.1204	.3288*	.1575*	.1909*
E3	.2076*	.2890*	.1595*	.0248	.1382*	–.0569	.0517
E4	.2118*	.1808*	.1311	.0085	.1571*	.0066	.0055
E5	.2349*	.2040*	.0957	.1518*	.2747*	.0879	–.0188
E6	.5505*	.2703*	.2226*	.2330*	.4511*	.1044	.1792*
O1	.2156*	.1033	.3225*	.3613*	.2033*	.0648	.1750*
O2	.2890*	.0250	.3087*	.2790*	.2292*	.0957	.3600*
O3	.3963*	.3101*	.4782*	.4108*	.3477*	.2915*	.2393*
O4	.1921*	.0534	.1213	.1777*	.2591*	.0065	.2273*
O5	.0495	.0218	.2467*	.0734	.0996	–.0384	.1754*
O6	.1234	.0441	.1759*	.2190*	.1180	–.0467	.2396*
A1	.2482*	.0474	–.0189	.0698	.3260*	–.0113	.2699*
A2	–.0600	–.1353*	–.0638	–.0428	.0661	.0595	.0410
A3	.2843*	.0077	.0964	.0125	.3217*	.1502*	.2266*
A4	–.0100	–.3547*	–.1000	–.0524	.0301	–.0094	.1664*
A5	–.0575	–.2164*	–.0706	.0121	.1253	.0989	.0483
A6	.1186	–.0747	–.0053	.2144*	.1224	.1905*	.4405*
C1	.0475	.0971	.0416	–.2249*	.0315	–.1514*	.0115
C2	.0119	.0218	–.0087	–.2582*	–.0157	–.0332	–.1806*
C3	–.1082	–.1256	–.0547	–.2169*	–.0209	–.0766	–.0786
C4	.0202	.0529	.0976	–.1312	.0177	–.0573	–.0586
C5	.0203	–.0437	–.0262	–.2394*	.0431	–.1433*	–.0617
C6	–.1978*	–.2213*	–.0347	–.3728*	–.1429*	–.1211	–.0543

* $p < .01$.
Note. Correlations for men are given above the diagonal; for women, below.

Table 45 con't

	N1	N2	N3	N4	N5	N6
PES	–.0576	.0078	–.0636	–.1014	.0668	–.1218
NES	.2117*	.4638*	.1856*	.0718	.2582*	.1773*
ATTEND	.1280	.1381	.1207	.0171	.1178	.0467
EBDM	.1297	.0708	.1397	.1127	.2337*	.1354
RES JOY	–.1781*	–.0569	–.1876*	–.0627	.0512	–.1967*
RES DIS	.2823*	.1540	.2047*	.3462*	.1938*	.2977*
EM CON	–.0083	–.2327*	–.0607	–.0480	–.0097	.0050
N1	1.0000	.5092*	.6855*	.5937*	.3502*	.6706*
N2	.4852*	1.0000	.5526*	.4061*	.4875*	.4166*
N3	.6595*	.5348*	1.0000	.6161*	.4727*	.6794*
N4	.5164*	.3428*	.6456*	1.0000	.3782*	.5890*
N5	.3282*	.3588*	.3460*	.2599*	1.0000	.3744*
N6	.5889*	.4975*	.6657*	.4986*	.3569*	1.0000
E1	–.0565	–.2555*	–.2219*	–.3201*	–.0028	–.1588*
E2	–.0034	–.1415*	–.1269	–.1980*	.0520	–.0320
E3	–.2237*	–.0095	–.3334*	–.3953*	.0513	–.3863*
E4	–.1468*	–.0723	–.2580*	–.2647*	–.1281	–.2856*
E5	.0925	.2070*	.0963	.0406	.2968*	.0592
E6	–.2748*	–.2792*	–.4191*	–.3500*	.0177	–.3067*
O1	.0291	.0131	–.0127	–.1704*	.2448*	–.0422
O2	–.0422	–.1137	–.0834	–.1996*	.0264	–.0867
O3	.1237	.1478*	.0014	–.1579*	.1896*	–.0087
O4	–.2144*	–.1553*	–.1746*	–.2547*	.0636	–.1743*
O5	–.1213	–.0575	–.1128	–.2155*	.0191	–.2083*
O6	–.0500	–.1786*	–.1305	–.2693*	.0632	–.1624*
A1	–.3431*	–.4925*	–.4542*	–.3715*	–.1343*	–.4074*
A2	–.0885	–.2963*	–.0818	–.0169	–.2039*	–.0670
A3	–.0680	–.3921*	–.2202*	–.1711*	–.1779*	–.2271*
A4	–.2098*	–.5994*	–.2177*	–.0767	–.2529*	–.1347*
A5	.1621*	–.0510	.3143*	.2820*	.0363	.1996*
A6	–.0275	–.2086*	–.0060	.0280	–.0447	–.0554
C1	–.3322*	–.2992*	–.5261*	–.3479*	–.3544*	–.6246*
C2	–.0512	.0010	–.1218	–.0184	–.2546*	–.2104*
C3	–.0902	–.1462*	–.1926*	–.0337	–.2916*	–.2874*
C4	–.1858*	–.1100	–.2648*	–.1721*	–.3124*	–.3699*
C5	–.2416*	–.2878*	–.3905*	–.2468*	–.4544*	–.5451*
C6	–.1046	–.2462*	–.2091*	–.0712	–.4740*	–.2566*

* $p < .01$.

Note. Correlations for men are given above the diagonal; for women, below.

Table 45 con't

	E1	E2	E3	E4	E5	E6
PES	.4978*	.2830*	.2817*	.2165*	.0573	.4838*
NES	.1065	.1397	.1270	.1025	.0769	.1415
ATTEND	.1784*	.0497	.0963	.0968	−.0837	.2008*
EBDM	.1593*	.1695*	−.0938	−.0203	.0943	.2067*
RES JOY	.4778*	.2649*	.2694*	.2420*	.2093*	.4887*
RES DIS	.1995*	.0554	−.1827*	.0374	−.1018	.0781
EM CON	.2484*	.1684*	−.0346	−.0378	−.1443	.1633*
N1	−.2318*	−.0862	−.3344*	−.0672	−.0856	−.2716*
N2	−.2986*	−.1585*	−.0405	.0566	.1027	−.1807*
N3	−.2395*	−.1193	−.2634*	−.1493	−.0251	−.3133*
N4	−.1604*	−.2395*	−.4693*	−.1383	−.0229	−.1121
N5	−.0664	−.1040	−.0628	−.0197	.1809*	−.0099
N6	−.2275*	−.0668	−.4247*	−.2029*	−.1705*	−.3089*
E1	1.0000	.4788*	.3621*	.2004*	.0935	.6113*
E2	.5339*	1.0000	.4134*	.1282	.2810*	.2968*
E3	.3272*	.2656*	1.0000	.4706*	.2879*	.3007*
E4	.3386*	.2834*	.5183*	1.0000	.2191*	.3370*
E5	.2030*	.3891*	.1965*	.2537*	1.0000	.3529*
E6	.5873*	.3496*	.3326*	.3689*	.2609*	1.0000
O1	.1846*	.0864	.1640*	.0505	.2151*	.2839*
O2	.2505*	.1165	.1250	.1224	.1609*	.2848*
O3	.3620*	.1506*	.2610*	.2910*	.2156*	.3921*
O4	.2235*	.1835*	.2121*	.2183*	.2756*	.3213*
O5	.0729	−.0687	.2808*	.1932*	.1236	.1274
O6	.2014*	.1215	.2186*	.1284	.0994	.2425*
A1	.5081*	.2306*	.2045*	.1808*	.0083	.4900*
A2	.0745	−.0619	−.2738*	−.1052	−.2686*	−.0814
A3	.5679*	.1847*	.0293	.1985*	−.0725	.3564*
A4	.1483*	.0163	−.2787*	−.1133	−.2889*	.0796
A5	−.0213	−.1003	−.3860*	−.1735*	−.0449	−.1493*
A6	.2492*	.0753	−.0523	−.0140	−.0492	.1434*
C1	.2371*	.0354	.3946*	.3747*	−.1180	.2739*
C2	.0118	.0004	.0557	.2447*	−.0212	−.0161
C3	.1120	−.0301	.0427	.1606*	−.1165	−.0153
C4	.1309	.0595	.3710*	.5453*	.0399	.1676*
C5	.1380*	.0609	.2532*	.4126*	−.1101	.1515*
C6	.0000	−.1158	−.0267	.0363	−.3412*	−.0646

* $p < .01$.

Note. Correlations for men are given above the diagonal; for women, below.

Table 45 con't

	O1	O2	O3	O4	O5	O6
PES	.1090	.3104*	.4322*	.1660*	.1151	.0092
NES	.1328	.1952*	.2841*	.1013	.0266	−.0252
ATTEND	.2441*	.3765*	.4806*	.1829*	.1960*	.0506
EBDM	.1477	.2101*	.3288*	.0335	−.1544	.0418
RES JOY	.0370	.1684*	.3755*	.1425	.0900	.0113
RES DIS	.1347	.2692*	.3332*	.0616	−.0295	.0473
EM CON	.0732	.2922*	.1970*	.0862	.0277	.1904*
N1	.1457	.0682	.0902	−.1236	−.1473	−.0070
N2	.0965	.0751	.1517	.0368	−.0447	−.0957
N3	.2084*	.0828	.0890	.0012	−.0710	−.0754
N4	.1464	.0523	.0630	−.0552	−.2004*	−.0132
N5	.2706*	.0382	.2452*	−.0201	−.0585	.0312
N6	.0812	.0775	−.0330	−.1230	−.1877*	−.0298
E1	.0148	.1564*	.4501*	.0965	.0860	−.0465
E2	−.0460	.0962	.1933*	.1357	−.0040	.0598
E3	−.0134	.0463	.2801*	.2410*	.2366*	−.0755
E4	−.0319	.0806	.2940*	.2153*	.1690*	−.0640
E5	.1434	−.0445	.2214*	.1509	.0171	.0638
E6	.1451	.2776*	.5034*	.1736*	.1327	.0456
O1	1.0000	.4207*	.4124*	.3618*	.3397*	.3042*
O2	.4945*	1.0000	.4872*	.4385*	.5034*	.3362*
O3	.3912*	.4868*	1.0000	.2221*	.2394*	.0690
O4	.3771*	.4312*	.3489*	1.0000	.4554*	.2502*
O5	.4598*	.4832*	.3522*	.3341*	1.0000	.3443*
O6	.4120*	.3533*	.2702*	.3923*	.2760*	1.0000
A1	.0949	.2188*	.1194	.2276*	.0437	.2769*
A2	−.1583*	−.0038	.0316	−.0088	−.0924	−.1370*
A3	−.0040	.1165	.2417*	.0066	−.0638	.0350
A4	−.0842	.0747	−.1257	.0121	−.0611	−.0264
A5	−.1605*	−.0072	−.0446	−.0385	−.2160*	−.1489*
A6	.0114	.2391*	.1764*	.1458*	.0135	.1504*
C1	−.0841	.0206	.1074	−.0105	.2034*	.0508
C2	−.3383*	−.1393*	−.0349	−.2740*	−.0652	−.2808*
C3	−.2865*	−.1120	.0320	−.1906*	−.0189	−.2343*
C4	−.0978	.0848	.1647*	.0124	.2085*	−.0353
C5	−.2177*	−.0228	.0480	−.0540	.0211	−.0488
C6	−.3212*	−.1191	−.1450*	−.2369*	−.0148	−.1966*

* $p < .01$.

Note. Correlations for men are given above the diagonal; for women, below.

Table 45 con't

	A1	A2	A3	A4	A5	A6
PES	.1410	.0213	.2544*	−.0294	−.0304	.1682*
NES	−.1073	−.1025	−.1447	−.3991*	−.1412	−.0332
ATTEND	−.0131	−.0200	.0741	−.0534	−.0530	.1329
EBDM	.1010	−.0808	.0170	.0162	−.0318	.1902*
RES JOY	.2830*	.0251	.2845*	.0500	−.0154	.1927*
RES DIS	.0686	.1914*	.1896*	.0926	.2097*	.2766*
EM CON	.2846*	.2528*	.2930*	.2616*	.2303*	.5290*
N1	−.2990*	−.0829	−.2713*	−.1438	.1343	.0928
N2	−.5333*	−.3065*	−.4212*	−.6086*	−.1170	−.1845*
N3	−.3928*	−.1550	−.3094*	−.1739*	.1772*	.0748
N4	−.2326*	−.0078	−.1101	.0060	.2854*	.1539
N5	−.2511*	−.2352*	−.2021*	−.2997*	−.0036	−.0081
N6	−.2593*	−.0293	−.2911*	−.0472	.2135*	.1519
E1	.4762*	.1929*	.6042*	.1798*	.0158	.2515*
E2	.2371*	−.0705	.1160	.0231	−.1160	.1930*
E3	.0323	−.2757*	.0619	−.2718*	−.3644*	−.1553*
E4	−.0131	−.1490	.0742	−.1954*	−.1537	−.0613
E5	−.0589	−.3285*	−.0595	−.2366*	−.1738*	−.0856
E6	.3190*	.0262	.4379*	.0792	−.0377	.1605*
O1	−.1158	−.2030*	−.1475	−.1024	−.1995*	−.0612
O2	.0230	−.0647	.0525	.0037	−.1111	.2040*
O3	.0135	−.0436	.2309*	−.0970	−.0979	.1633*
O4	−.0906	−.1858*	.0085	−.0609	−.2141*	.0007
O5	.0101	−.1120	−.0204	−.0867	−.2544*	−.0870
O6	.1274	−.1458	−.0504	.0682	−.1865*	.1340
A1	1.0000	.3756*	.4786*	.5075*	.0198	.3143*
A2	.1943*	1.0000	.4637*	.4643*	.3948*	.2627*
A3	.4298*	.3496*	1.0000	.4281*	.3008*	.3709*
A4	.2818*	.4479*	.3887*	1.0000	.3437*	.3529*
A5	−.0001	.3149*	.1964*	.2163*	1.0000	.3927*
A6	.3137*	.2503*	.3695*	.2841*	.2654*	1.0000
C1	.2972*	.0373	.3269*	.0515	−.2632*	.0161
C2	−.0464	.0955	.1767*	.0227	.0119	−.1072
C3	.0767	.2755*	.3880*	.1469*	.0778	.0571
C4	.1330*	−.0380	.1867*	−.0785	−.1059	.0196
C5	.1897*	.1188	.3105*	.0917	−.0769	−.0029
C6	.0645	.1876*	.2714*	.2377*	.0518	−.0271

* $p < .01$.

Note. Correlations for men are given above the diagonal; for women, below.

Table 45 con't

	C1	C2	C3	C4	C5	C6
PES	.0182	−.0236	−.0387	.0541	.0046	−.0777
NES	−.1008	.0664	−.1596	−.0135	−.0865	−.1832*
ATTEND	.0046	.0647	−.0182	−.0030	−.0525	.0527
EBDM	−.2876*	−.1510	−.2861*	−.2250*	−.2240*	−.3835*
RES JOY	.1108	.0098	.0553	.1458	.0895	−.1240
RES DIS	−.2647*	−.1084	−.0842	−.1400	−.1690*	−.1063
EM CON	−.0522	−.1235	−.0101	−.0793	−.0271	−.0033
N1	−.4750*	.0471	−.2717*	−.1155	−.3338*	−.2200*
N2	−.2985*	.0939	−.2258*	.0327	−.2252*	−.2694*
N3	−.5699*	−.0831	−.4056*	−.2002*	−.4455*	−.3533*
N4	−.4946*	−.0700	−.2738*	−.2271*	−.3702*	−.2850*
N5	−.3646*	−.1068	−.3862*	−.1858*	−.4028*	−.5617*
N6	−.6237*	−.0467	−.3421*	−.2174*	−.4482*	−.2526*
O1	.2272*	.0056	.1816*	.1892*	.1426	−.0301
O2	.0336	−.0142	−.1305	.1177	.0278	−.1070
O3	.4075*	.1382	.1901*	.5112*	.3252*	.0312
O4	.2335*	.1066	.2094*	.5494*	.3803*	−.0592
O5	.0884	.0251	−.0959	.0770	.0040	−.2402*
O6	.2343*	.0127	.0999	.1892*	.1600*	−.1209
E1	−.0824	−.2044*	−.2842*	−.1629*	−.2870*	−.2404*
E2	.0372	−.0798	−.1538	.0142	−.0983	−.0262
E3	.0816	−.0257	.0140	.1124	−.0007	−.1467
E4	.1145	−.1030	−.1495	.1372	−.0080	−.0893
E5	.2955*	−.0228	.0646	.2258*	.0353	.0587
E6	.0308	−.1787*	−.1876*	−.0923	−.1906*	.0029
A1	.2090*	.0328	.1958*	.0024	.1344	.1254
A2	.1130	.1243	.3694*	−.0812	.1903*	.2768*
A3	.3460*	.0212	.3844*	.0699	.2638*	.1849*
A4	.0208	−.1119	.1852*	−.1843*	.0347	.2033*
A5	−.2417*	−.0423	.0976	−.1912*	−.0262	.0132
A6	−.1328	.0083	−.0505	−.1153	−.0369	−.0120
C1	1.0000	.2718*	.5346*	.4237*	.5554*	.4609*
C2	.4339*	1.0000	.3459*	.3036*	.4336*	.2665*
C3	.4830*	.4592*	1.0000	.4554*	.5990*	.5044*
C4	.5436*	.4418*	.3985*	1.0000	.5454*	.2548*
C5	.6484*	.6442*	.5243*	.6024*	1.0000	.3740*
C6	.4223*	.4037*	.4313*	.3260*	.4066*	1.0000

* $p < .01$.

Note. Correlations for men are given above the diagonal; for women, below. Sample sizes varied from 253 to 288 for men, and from 366 to 403 for women. The above significance tests are given for the reader's convenience only. However, to prevent escalating Type 1

errors, these correlations are only noted as significant if $p < .01$. Nonetheless, because there are 1332 significance tests in the above table, approximately 13 of these correlations can be expected to be significant by chance alone. See Table 32 – 37 for the rationale for the Type 1 error rate used.

PES = Positive Expressivity Scale. NES = Negative Expressivity Scale. ATTEND = Attending to Emotions. EBDM = Emotion-Based Decision-Making. RES JOY = Responsive Joy. RES DIS = Responsive Distress. EM CON = Empathic Concern.

Table 46
Primary-Factor Pattern Matrix for the 7 Personality ESI Variables and the 30 NEO Facets for Men

	Primary Factor							
Measure	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**h^2**
PES	−.11	.09	.08	−.03	.00	**.65**	.13	.53
NES	.11	−.08	**−.34**	−.02	−.08	**.61**	.09	.46
ATTEND	.06	−.11	−.01	.02	.22	**.55**	−.07	.38
EBDM	.07	.18	.09	**−.34**	−.03	**.30**	.06	.30
RES JOY	−.14	**.27**	.17	.03	−.03	**.45**	.10	.44
RES DIS	**.36**	−.05	**.28**	−.04	.06	**.41**	−.05	.42
EM CON	.10	−.12	**.51**	−.08	.18	.21	.15	.40
N1	**.78**	−.08	−.07	.03	−.00	.06	−.00	.64
N2	**.51**	.02	**−.60**	.10	−.08	**.29**	−.10	.76
N3	**.78**	.04	−.13	−.09	.04	−.01	−.03	.71
N4	**.71**	.20	.11	−.07	−.02	−.07	**−.27**	.66
N5	**.36**	**.34**	−.24	−.24	−.03	.15	−.13	.49
N6	**.79**	−.15	.03	−.12	−.04	.00	.07	.71
E1	−.18	**.31**	**.42**	.11	−.05	**.38**	.18	.66
E2	−.05	.12	.17	−.04	−.02	.14	**.64**	.54
E3	**−.27**	.23	−.24	**.36**	.08	.13	**.41**	.68
E4	.06	**.34**	−.09	**.50**	.10	.05	.15	.44
E5	−.08	**.54**	−.18	−.01	.01	−.09	.11	.37
E6	**−.25**	**.54**	**.25**	.09	.08	**.32**	−.02	.66
O1	.04	.19	−.12	**−.25**	**.55**	.10	−.20	.51
O2	.11	−.10	.11	−.01	**.68**	**.33**	−.00	.66
O3	.09	**.34**	.06	.12	**.29**	**.53**	−.12	.66
O4	−.02	.11	−.05	.04	**.57**	.02	.10	.38
O5	−.12	−.04	−.08	.16	**.70**	.01	−.04	.55
O6	−.06	−.06	.09	−.21	**.52**	−.10	.07	.32
A1	**−.31**	.01	**.56**	−.06	−.04	.08	.13	.49
A2	−.03	−.24	**.54**	.14	−.20	.14	−.23	.54
A3	−.19	.20	**.65**	.20	−.08	.17	−.17	.67
A4	−.07	−.07	**.76**	−.10	.04	−.21	−.07	.63
A5	**.32**	−.00	**.50**	.03	−.24	−.06	−.17	.43
A6	**.28**	−.04	**.63**	−.03	.05	.11	.18	.48
C1	**−.54**	−.00	−.02	**.48**	.16	.01	−.12	.68
C2	.06	−.12	−.09	**.48**	−.16	.10	−.00	.27
C3	−.20	−.08	.19	**.67**	−.13	.02	**−.25**	.69
C4	.09	.13	−.08	**.80**	.12	−.10	.23	.71
C5	−.22	−.02	.07	**.68**	−.10	−.02	.01	.62
C6	**−.25**	**−.51**	.12	**.41**	.05	.01	−.08	.58

Table 46 con't

Primary Factor	Primary Factor						
	1	**2**	**3**	**4**	**5**	**6**	**7**
1	1.00	–.03	–.14	–.28	–.04	.07	–.14
2	–.03	1.00	–.05	–.00	.10	.27	.21
3	–.14	–.05	1.00	.01	–.05	.11	–.03
4	–.28	–.00	.01	1.00	–.03	.04	.04
5	–.04	.10	–.05	–.03	1.00	.19	.06
6	.07	.27	.11	.04	.19	1.00	.13
7	–.14	.21	–.03	.04	.06	.13	1.00

h^2 = Communality. PES = Positive Expressivity Scale. NES = Negative Expressivity Scale. ATTEND = Attending to Emotions. EBDM = Emotion-Based Decision-Making. RES JOY = Responsive Joy. RES DIS = Responsive Distress. EM CON = Empathic Concern.

Table 47
Primary-Factor Pattern Matrix for the 7 Personality ESI Variables and the 30 NEO Facets for Women

	Primary Factor							
Measure	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**h^2**
PES	–.06	**.72**	–.00	–.04	.10	.01	–.06	.55
NES	–.04	**.55**	**–.46**	.12	–.08	–.13	–.00	.53
ATTEN	.09	**.41**	–.14	.24	**.41**	**–.27**	–.02	.48
EBDM	**–.25**	**.27**	–.04	.17	**.30**	–.05	.11	.34
RES JOY	–.01	**.58**	.16	–.00	.10	.21	.01	.46
RES DIS	–.03	**.35**	–.00	**.41**	–.02	–.06	.24	.35
EM CON	–.09	.10	.00	.03	.19	–.10	**.53**	.40
N1	–.00	.04	–.04	**.75**	–.00	–.03	.08	.56
N2	–.04	.04	**–.40**	**.63**	.02	–.07	–.22	.71
N3	–.12	–.13	.08	**.83**	.04	.08	.01	.76
N4	–.01	–.18	.15	**.66**	–.13	.07	–.01	.54
N5	**–.37**	.16	–.19	**.35**	.04	.12	.02	.41
N6	**–.33**	.09	.06	**.66**	–.10	–.06	–.04	.68
E1	.11	**.58**	.01	–.12	–.04	.18	**.32**	.67
E2	–.02	**.35**	–.12	–.06	–.16	**.35**	.19	.39
E3	.22	.08	**–.60**	–.24	.08	.15	.17	.61
E4	**.45**	.12	**–.27**	–.08	.11	**.33**	.07	.51
E5	–.05	.18	–.12	.16	.11	**.62**	–.15	.57
E6	.01	**.58**	–.02	**–.36**	.12	.17	.03	.63
O1	**–.26**	.11	–.06	–.08	**.63**	.03	–.04	.55
O2	.00	.07	.13	–.03	**.70**	.05	.12	.57
O3	.17	**.39**	–.06	.21	**.56**	–.03	.07	.62
O4	–.16	.01	.04	–.22	**.46**	**.30**	.08	.45
O5	.13	–.15	–.11	–.10	**.69**	–.01	–.01	.50
O6	–.19	–.06	–.15	–.21	**.38**	.07	**.26**	.37
A1	.00	**.25**	.12	**–.45**	–.03	.10	**.35**	.54
A2	.14	.09	**.52**	–.03	–.03	–.14	.09	.37
A3	**.34**	**.40**	**.35**	–.06	–.06	–.02	**.32**	.63
A4	–.00	.04	**.61**	**–.27**	–.02	–.10	.17	.55
A5	.03	–.02	**.54**	**.32**	–.04	.14	.07	.41
A6	.03	–.03	.21	.10	.07	.04	**.61**	.47
C1	**.64**	.05	–.22	**–.34**	.02	–.14	.10	.71
C2	**.71**	.12	.06	.10	–.14	.00	–.24	.58
C3	**.66**	.01	.17	.04	–.09	–.04	.01	.49
C4	**.73**	–.07	–.19	–.02	.13	.13	.05	.60
C5	**.78**	.02	.01	–.19	–.02	.05	–.04	.71
C6	**.54**	–.10	.16	–.10	–.11	**–.25**	.03	.48

Table 47 con't

Primary Factor	Primary Factor						
	1	**2**	**3**	**4**	**5**	**6**	**7**
1	1.00	.04	.01	–.23	–.08	–.03	.03
2	.04	1.00	–.09	–.03	.21	.21	.28
3	.01	–.09	1.00	–.01	–.15	–.14	.20
4	–.23	–.03	–.01	1.00	–.06	–.06	–.15
5	–.08	.21	–.15	–.06	1.00	.12	.19
6	–.03	.21	–.14	–.06	.12	1.00	.07
7	.03	.28	.20	–.15	.19	.07	1.00

h^2 = Communality. PES = Positive Expressivity Scale. NES = Negative Expressivity Scale. ATT = Attending to Emotions. EBDM = Emotion-Based Decision-Making. RES JOY = Responsive Joy. RES DIS = Responsive Distress. EM CON = Empathic Concern.

Most of the seven ESI measures also had secondary pattern coefficients for one or more of the Big Five factors. Three of these secondary loadings were the same for men and women. First, Negative Expressivity had a negative pattern coefficient for the Agreeableness factor. This indicates that Agreeable people do not express their negative emotions. Second, Emotion-Based Decision-Making had a negative pattern coefficient for the Conscientiousness factor. This indicates that Conscientious people based their decisions on logic, not emotions. Third, Responsive Distress had a positive pattern coefficient for the Neuroticism factor, indicating that Neurotic people are more likely to get upset when in the presence of others who are upset.

Conclusions

Summary

I examined the relations of the seven personality subcomponents of ESI to the Big Five dimensions of personality (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) using a factor analysis of the 7 personality measures of ESI and the 30 NEO-PI-R facets. For both men and women, six of the seven ESI scales formed a distinct factor, which I labeled Sensitivity. This factor had relatively low correlations with the Big Five factors. Thus, personality aspects of ESI can be considered to form a coherent construct, relatively independent of the Big Five. However, most of these variables also had salient pattern coefficients for one of the Big Five factors, and the remaining measure, Empathic Concern, loaded on a factor marked primarily by Agreeableness facets.

Relation of Results to My Original Hypotheses and to Previous Research

Originally, I hypothesized particular individual relations between the personality subcomponents of ESI and the Big Five: I did not anticipate that they would form a coherent construct that is relatively independent of the Big Five. No previous research had examined this question, but there was no reason to believe that personality subcomponents of ESI would fall outside the range of concepts covered by the Big Five: as far as I know, no ESI researcher has ever argued this. I did, however, examine the evidence for each of the original predictions I made.

I hypothesized that Positive Expressivity is most closely related to Extraversion, that Negative Expressivity is most closely related to Neuroticism, and that Attending to Emotions is most closely related to Agreeableness. I did not hypothesize specific relations between the other four personality subcomponents and the Big Five. Examining the results in Table 29 in Chapter 3 and the secondary coefficients in Tables 46 and 47, we see that only one of these predictions was supported (see Table 48 for a summary of these findings). Positive Expressivity was most closely associated with Extraversion. This finding is consistent with other research on this topic (see Gross & John, 1999).

Based on previous research findings, I hypothesized that Negative Expressivity was most closely associated with Neuroticism. This hypothesis was confirmed in the UBC Student Sample, but in the Eugene-Springfield Community Sample Negative Expressivity was related to Agreeableness. The difference between these two findings cannot be attributed to different instruments being used, because the same scale was used to measure Negative Expressivity in these two samples. Further research is needed to clarify the relation of Negative Expressivity to the Big Five.

Table 48
Strongest Relations Between the 7 Personality Subcomponents and the Big Five Dimensions of Personality

Measure	Predicted Strongest Relation	Highest Correlations[a]	Secondary Factor Loadings[b]
PES	Extraversion	Extraversion	
NES	Neuroticism	Neuroticism, Conscientiousness	Agreeableness (reversed)
ATTEND	Agreeableness	Openness	
EBDM		Openness	Conscientiousness (reversed)
RES JOY		Extraversion, Agreeableness	
RES DIS		Agreeableness	Neuroticism
EM CON		Agreeableness	

a. Obtained using the UBC Student Sample.
b. Obtained using the Eugene-Springfield Community Sample.
PES = Positive Expressivity Scale. NES = Negative Expressivity Scale. ATTEND = Attending to Emotions. EBDM = Emotion-Based Decision-Making. RES JOY = Responsive Joy. RES DIS = Responsive Distress. EM CON = Empathic Concern.

Based on previous research, I hypothesized that Attending to Emotions is most closely associated with Agreeableness. I found that Attending to Emotions was strongly related to Openness in the UBC Student Sample, but had no simple relationship to the Big Five in the Eugene-Springfield Sample. Previous research had not examined the relation of Attending to Emotions with Openness, and therefore this finding does not contradict other research in this area. Further research is needed to clarify the relation of Attending to Emotions to the Big Five.

What are we to make of the fact that personality aspects of ESI form a coherent construct, relatively independent of the Big Five? If Sensitivity falls outside the Big Five, it will not be the first personality construct to do so. Masculinity, Frugality (Saucier & Goldberg, 1998), and Hedonism (Becker, 1999) may all lay outside the range of constructs covered by the Big Five. On the other hand, it could be that the separateness of the Sensitivity factor is related to on-going disagreements regarding the nature of the Intellect or Openness to Experience factor. For both men and women, the Feelings facet of Openness (O3) had its highest loading on the Sensitivity factor. the Feelings facet would be considered a part of Openness to Experience but would not be considered a part of Intellect (Lew Goldberg, personal communication, April 26, 2001). Further examination of the relation of Sensitivity to various facets of Openness and Intellect are needed before we can conclude that this construct falls outside the Big Five domain.

Final Word

With the exception of the Empathic Concern subscale, the measures of personality subcomponents of ESI formed a first-order factor, which I labeled Sensitivity. This factor has only small correlations with the Big Five factors, and thus Sensitivity seems to fall largely outside the range of the Big Five. On the other hand, most of the personality measures of ESI had secondary loadings on the Big Five factors, demonstrating that these measures are related to the Big Five as well.

CHAPTER 6: RELATION OF EMOTIONAL AND SOCIAL INTELLIGENCE TO SOCIALLY DESIRABLE RESPONDING

Background

Self-Report Measures

Most measures of ESI are self-report. With any self-report inventory, rather than responding honestly, participants may lie, either intentionally, to make a good impression by selecting those answers that seem the most socially desirable (Impression Management), or unintentionally, if they lack personal insight (Self-Deceptive Enhancement). This is referred to as Socially Desirable Responding (SDR; Paulhus, 1991). SDR is such a widespread concern that most major self-report test batteries—such as the MMPI (McKinley, Hathaway, & Meehl, 1948), the Eysenck Personality Inventory (Eysenck & Eysenck, 1964), the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975), the Comrey Personality Scales (Comrey, 1980), the Personality Research Form (Jackson, 1967), the Differential Personality Questionnaire (Tellegen, 1982), the California Psychological Inventory (Gough, 1987), and the 16PF (Winder, O'Dell & Karson, 1975)—include a measure of SDR.

One measure of ESI (the EQ-i; Bar-On, 1997b) includes a measure of SDR, and one other measure of ESI attempted to control for SDR during the development process (the TEIS; Tett, Wang, Gribler, & Martinez, 1997). However, most self-report measures of Emotional Intelligence, Social Intelligence, Empathy, and Alexithymia have done neither of these, and have not explored the possible relation of scores on their scales and subscales with SDR. Because of this, little is known regarding the relation of SDR and to self-report measures of the ESI subcomponents.

There are two exceptions to this. First, when the TEIS was developed, its creators attempted to control for SDR bias during the development process, by ensuring that each item had a higher correlation with the total score for its own scale than it did with SDR. Despite these efforts, 8 of the 10 subscales in an early version of the TEIS had statistically significant correlations with SDR (Robert Tett, personal communication, May 1999). The subscales with significant correlations included Emotion in the Self: Verbal (a measure of Emotional Understanding) and Recognizing Emotion in Others. One of the subscales that was unrelated to SDR was the Flexible Planning subscale (a measure of Emotion-Based Decision-Making).

Second, two studies have examined the relation of the TAS-20 to SDR. One of these studies (Linden, Lenz, & Stossel, 1996) used a sample of 80 college students, and found no relation between scores on the TAS-20 and measures of Impression Management and Self-Deceptive Enhancement. The other study (Kroner & Forth, 1995) used a large sample of male inmates (n = 508), and found that the TAS-20 was negatively correlated with each of three factor scores from an early measure of SDR. Given the differences in the participant populations and the measures of SDR, it is unclear to what we should attribute the differences in the results: different types of participants, different aspects of SDR, or sampling fluctuations and differences in power.

In summary, from the little research that is available, it appears that many—but not all—self-report measures of ESI are related to SDR, and these relations may not hold in all types of participants. Given that many measures of cognitive subcomponents of ESI are self-report, it will be interesting to see if any of these measures are more highly correlated with SDR than intelligence composites.

Maximum-Performance Measures

Some maximum-performance measures of ESI are multiple-choice tests. With multiple-choice tests, relations with Impression Management would not be expected. However, not all maximum-performance measures of ESI are traditional multiple-choice tests. The Levels of Emotional Awareness Scale, for example, uses open-ended questions. It is conceivable that scores on this scale are correlated with Impression Management. It could be, for example, that participants who are trying to make a good impression would attempt to describe their emotions in either more or less detail than other participants. The MSCEIT subscales use consensus scoring, in which the score that a participant obtains for a particular item is equal to the proportion of the norm group who gave that response. It could be that participants who are trying to make a good impression are more likely to try to put the same response as everyone else, rather than trying to pick the answer that they think it is best. Alternatively, it could be that people who are concerned about the impression they make are sensitive to, aware of, and knowledgeable about other people's emotions, because this gives them feedback on the impression they are making. For both of these reasons it is conceivable that scores on the MSCEIT subscales are related to SDR. Finally, the TEIS Emotional Appropriateness subscale uses a hybrid of self-report and maximum-performance. I have not seen this type of response format before, and it is not immediately obvious that scores would necessarily be unrelated to SDR. No research has examined the relations of any of these measures to SDR.

Research Question

From this literature review I concluded that many ESI measures are self-report, but few have included any method of measuring or controlling for SDR. In addition, some maximum-performance measures of ESI could also be influenced by SDR. At this time, little is known regarding the influence of SDR on ESI measures. This leads to the following research question:

To what extent are measures of ESI related to SDR?

Research Approach

Two different approaches are commonly used to determine if SDR influences scores on a test. The first approach is to correlate scores on the test with one or more measures of SDR. If these are positively correlated, this suggests (but does not prove) that people who were motivated to respond in a socially desirable manner were able to manipulate their responses to get higher scores on the test. One alternative explanation is that the desire to make a good impression causes people to behave in a certain way and that their responses to the test are an accurate reflection of their behaviour. The advantage of the correlational approach is that the test itself has not been altered: participants engaged in a study of the relation of the test with SDR are given the same instructions as other participants would be given. The disadvantage is that this is a correlational approach, and does not allow causal inference.

The second approach is to randomly assign participants to two groups: the first group of participants completes the test under normal circumstances; the second group of participants is specifically instructed to complete the test in a socially desirable way. Means for the two groups are compared to determine if the special instructions influenced test responses. The advantage of this approach is that the experimental manipulation allows clear causal inferences. The disadvantage is that the researcher is unable to tell the extent to which scores on the ordinary test are influenced by SDR. If all participants are trying to make a

good impression, for example, then no difference may be found between the regular and special-instruction groups.

Because I was interested in examining the extent to which SDR may be influencing scores on the ESI measures as they are usually administered, I selected the first approach. It must be borne in mind, however, that this approach does not allow causal inferences.

Hypotheses

I hypothesized all self-report measures of ESI to be correlated with Impression Management, because Emotional Intelligence and related areas are described as being desirable. For self-report measures of cognitive subcomponents of ESI, I also examined whether their correlations with the intelligence composites were higher than their correlations with SDR.

Method

The UBC Student Sample, as described in Chapter 2: The Dimensional Structure of Emotional and Social Intelligence, was used. The measures and data screening procedures involved were described in that chapter.

Data Analysis

Each of the 31 ESI measures and each of the 4 ESI factors that resulted from the dimensional analysis of cognitive subcomponents of ESI were correlated with two measures of SDR: the Impression Management and Self-Deceptive Enhancement subscales of the PDS: BIDR-7. In addition, for each self-report measure, the largest correlation with the SDR subscales were compared with the largest correlation with the intelligence composites, to determine if any of these measures were more highly correlated with SDR than with intelligence.

These correlations were first reported in Chapter 3, but because new analyses were done on these correlations, these correlations are repeated here. Correlations that have been corrected for attenuation due to lack of internal consistency are also reported. As was explained in Chapter 3, there is no existing expression for the variance of a fully-disattentuated correlation when coefficient alpha is used as the estimate of reliability, but a rationale for a significance test was developed based upon the work of Hakstian et al. (1988).

As was the case in Chapter 3, to prevent escalating Type 1 error rates, each significance test that I used to make conclusions regarding the ESI measures used a Type 1 error rate of .001. The first family of tests—involving correlations between ESI measures and the SDR measures—included 70 significance tests, and therefore had a family-wise error rate of no more than .07. The second family of tests—including 7 comparisons of the correlations of the self-report ESI measures with the cognitive composites and the SDR measures—had a family-wise error rate of no more than .007. For comparison purposes, I first examined the correlations of the intelligence and personality variables to SDR. For these comparison correlations, I used a Type 1 error rate of .01 to test significance. This family of tests therefore had a family-wise error rate of no more than .70 (i.e., there was a relatively high probability that one or two of these tests were significant by chance alone). The rationale for the Type 1 error rates used was given in more detail in the Introduction.

Table 49
Correlations of Intelligence and Personality Measures with Socially Desirable Responding Measures, for Men and Women Combined (Calculated for Comparison with Later Correlations)

	IM	SDE
AV: Advanced Vocabulary	.08	.24*
IO: Inventive Opposites	−.13	.11
RD: Reading	−.05	.22
HW: Hidden Words	.01	−.01
IW: Incomplete Words	−.07	−.10
RW: Rearranged Words	.14	.16
FB: Form Board	−.02	.17
PF: Paper Folding	−.05	.15
SD: Surface Development	.12	.07
FC: Figure Classification	.03	.01
LS: Letter Sets	.03	.14
NS: Number Series	.03	.01
N1: Anxiety	.01	−.38*
N2: Anger	−.23	−.35*
N3: Depression	−.05	−.39*
N5: Immoderation	−.29*	−.25*
N6: Vulnerability	−.01	−.37*
E1: Friendliness	.10	.32*
E2: Gregariousness	−.11	.25*
E3: Assertiveness	−.08	.36*
E6: Cheerfulness	.04	.36*
O1: Imagination	.01	.31*
O2: Artistic Interest	.25*	.18
O3: Emotionality	.15	.10
O4: Adventurousness	.11	.34*
O5: Intellect	.07	.36*
A2: Morality	.58*	.08
A3: Altruism	.36*	.28*
A4: Cooperation	.40*	.07
A6: Sympathy	.39*	.06
C1: Self-Efficacy	.21	.45*
C3: Dutifulness	.46*	.16
C4: Achievement-Striving	.30*	.16
C5: Self-Discipline	.29*	.15
C6: Cautiousness	.30*	.05

* $p < .01$.
Note. For the intelligence tests, these correlations were based on sample sizes that varied from 141 to 145. The correlations for the personality measures were based on a sample size of 119.

Results

Comparison Correlations for Intelligence and Personality Measures

The 12 intelligence tests and the 23 IPIP facets of personality were correlated with both Impression Management and Self-Deceptive Enhancement. These correlations were first reported in Table 23, but are repeated here, for the reader's convenience, in Table 49.

None of the 12 intelligence tests were correlated with Impression Management. One of these tests did have a significant positive correlation with Self-Deceptive Enhancement; this was the Advanced Vocabulary test. One way of interpreting this correlation would be to say that people with large vocabularies may have inflated egos: they think they are better than they actually are. Alternatively, because only 1 of the 24 correlations for the intelligence tests was significant, it is possible that this one significant result is a Type 1 error. In contrast, almost every one of the 23 personality facets was correlated with either Impression Management or Self-Deceptive Enhancement.

It is interesting to note that each of the five personality domains was primarily associated with either one or the other of the two SDR measures. Each of the five measures of Neuroticism had a small to moderate negative correlation with Self-Deceptive Enhancement. This suggests that Neurotic people have unrealistically negative self-views. Measures of Extraversion and Openness, on the other hand, tended to have small to moderate positive correlations with Self-Deceptive Enhancement: Extraverts and Open people tend to have unrealistically positive self-views. Finally, most measures of Agreeableness and Conscientiousness had small to moderate positive correlations with Impression Management: Agreeable and Conscientious people may be trying to make good impression, or people who are trying to make good impressions may claim to be agreeable and conscientious.

It is important to note that not all self-report personality measures were correlated with Impression Management. Most measures of Neuroticism, Extraversion, and Openness had non-significant correlations with Impression Management.

ESI Measures

The relations of the 31 measures of ESI and the 4 cognitive factors of ESI with Impression Management and Self-Deceptive Enhancement were examined. These correlations were originally reported in Tables 25, 26, 27, 28, and 29, but are repeated here for the reader's convenience. The results for the self-report and the maximum-performance measures will be discussed separately.

Self-Report Measures of ESI

Originally, I hypothesized that each of the self-report subcomponents of ESI would be positively correlated with Impression Management, because Emotional Intelligence is discussed as being socially desirable. However, only one of these measures was correlated with Impression Management: this was the IRI Empathic Concern subscale (see Table 50).

In contrast, two of the self-report measures of personality subcomponents of ESI—Positive Expressivity and Attending to Emotions—and each of the self-report measures of cognitive subcomponents were correlated with Self-Deceptive Enhancement. Each of these correlations was in the direction that indicates that greater ESI is associated with greater Self-Deceptive Enhancement.

Table 50
Correlations with Socially Desirable Responding for Self-Report ESI Measures

ESI Measure	Uncorrected Correlations		Correlations Corrected for Attenuation Due to Lack of Internal Consistency	
	IM	**SDE**	**IM**	**SDE**
Personality Subcomponents				
Positive Expressivity	.10	.31*	.13	.42*
Negative Expressivity	−.21	−.01	−.29	−.01
TMMS Attention	.29	.35*	.37	.46*
TEIS Flexible Planning	.20	.21	.26	.28
QSE Positive Sharing	.23	.28	.30	.38
TEIS Empathy	.25	.01	.31	.01
IRI Empathic Concern	.30*	.09	.40*	.12
Cognitive Subcomponents				
TAS-20 Difficulty Describing Feelings	−.10	−.28*	−.13	−.37*
TAS-20 Difficulty Identifying Feelings	−.19	−.48*	−.25	−.63*
TMMS Repair	.18	.43*	.23	.57*
TEIS Regulation of Emotions in the Self	.14	.50*	.18	.64*
TEIS Regulation of Emotions in Others	.11	.37*	.14	.49*
TEIS Recognition of Emotions in Others	.24	.37*	.31	.49*

* $p < .001$.
Note. The sample size for the personality subcomponents was 114. For the cognitive subcomponents, these correlations are based on sample sizes that varied from 142 to 143. Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.

Next, I wanted to determine if any of the self-report measures of cognitive subcomponents of ESI were more strongly related to SDR than to intelligence. Therefore, I compared the largest absolute correlation with an intelligence composite with the largest absolute correlation with a SDR measure. For one of these measures—TAS-20 Difficulty Identifying Feelings—there was a significant difference. This subscale was more closely associated with Self-Deceptive Enhancement than with intelligence composites. The specific results of these analyses appear in Table 51.

Factor Scores

The relation of the factor scores obtained in the dimensional analysis of ESI in Chapter 2 with Impression Management and Self-Deceptive Enhancement was examined. See Table 52. None of the factor scores were correlated with Impression Management. However, two of these factor scores—factor 2 (Perceived Difficulty with Emotions) and factor 4 (Emotional Understanding of Others and Regulation of Emotion)—were correlated with Self-Deceptive Enhancement. This is not surprising because factor 2 correlated highly with Neuroticism, and factor 4 correlated highly with Extraversion, and facet scores for both Neuroticism and Extraversion were consistently correlated with Self-Deceptive Enhancement.

Maximum-Performance Measures of ESI

The correlations of the maximum-performance measures of ESI with the SDR measures are given in Table 52. I will divide my discussion of these results according to the type of maximum-performance test used.

Traditional Multiple-Choice Tests

The four OGSI tests are traditional multiple-choice tests. Scores on these tests were unrelated to Impression Management and Self-Deceptive Enhancement.

Maximum-Performance Tests with Consensus Scoring

The MSCEIT subscales use consensus scoring: your score on a particular item is equal to the proportion of the norm group who gave the same response. None of these scales had significant correlations with either Impression Management or Self-Deceptive Enhancement.

Open-Ended Maximum-Performance Tests

The Levels of Emotional Awareness Scale is an open-ended measure, in which participants are asked how they would feel in a number of emotionally-evocative situations. Scores on the Levels of Emotional Awareness Scale were unrelated to Self-Deceptive Enhancement and Impression Management.

Hybrid Method

The TEIS Emotional Appropriateness subscale represents a hybrid method—a combination of self-report and maximum-performance that was described in detail in Chapter 2. Scores on the Emotional Appropriateness subscale were unrelated to Self-Deceptive Enhancement and Impression Management.

Table 51
Comparing the Largest Absolute Correlation with Socially Desirable Responding to the Largest Absolute Correlation with an Intelligence Composite, for Self-Report Measures of Cognitive Subcomponents of ESI

ESI Measure	Largest SDR Correlation	Largest Intelligence Correlation	*n*	T_2	*p*
DDF	–.28	–.13	143	1.50	.137
DIF	–.48	–.12	143	3.89	.000
REPAIR	.43	.26	142	1.80	.074
REG SELF: men	.50	.55	46	0.34	.736
REG SELF: women	.50	.22	95	2.37	.020
REG OTHERS	.37	.13	142	2.34	.021
REC OTHERS	.37	.14	143	2.36	.020

Note. The sample sizes given are the smallest sample sizes for the three correlations involved: the correlation between the ESI measure and the SDR measure, the correlation between the ESI measure and the intelligence composite, and the cross-correlation between the SDR measure and the intelligence composite.
To prevent excessive numbers of Type 1 errors, these differences were only considered significant if $p < .001$. This resulted in a family-wise error rate for these seven comparisons of no more than .007.
DDF = TAS-20 Difficulty Describing Feelings. DIF = TAS-20 Difficulty Identifying Feelings. REG SELF = TEIS Regulation of Emotion in the Self. REG OTHERS = TEIS Regulation of Emotion in Others. REC OTHERS = TEIS Recognition of Emotion in Others.
T_2 = William's (1959) T_2 procedure for comparing two dependent correlations. This statistic has a chi-square distribution with n–3 degrees of freedom.

Table 52
Correlations with Socially Desirable Responding for Factor Scores and Maximum-Performance ESI Measures

ESI Measure	Uncorrected Correlations		Correlations Corrected for Attenuation Due to Lack of Internal Consistency	
	IM	**SDE**	**IM**	**SDE**
Factor Scores				
Factor 1	.06	.08	.09	.12
Factor 2	−.20	−.51*	−.25	−.66*
Factor 3	.08	.21	.11	.30
Factor 4	.20	.36*	.29	.53*
Maximum-Performance Multiple Choice				
EX GR	−.03	.10	−.06	.21
CAR PR	−.02	−.03	−.04	−.05
MS CAR	−.01	.05	−.02	.08
SOC TR	.12	.18	.18	.27
Maximum-Performance Consensus Scoring				
MSCEIT A	−.08	.14	−.11	.19
MSCEIT B	.01	.01	.01	.01
MSCEIT C	.05	.12	.08	.19
MSCEIT D	.09	.23	.15	.39
MSCEIT E	−.02	.00	−.03	.00
MSCEIT F	−.02	−.00	−.03	−.00
MSCEIT G	.13	.19	.17	.25
MSCEIT H	.14	.22	.22	.35
MSCEIT I	.17	−.01	.22	−.01
MSCEIT J	−.03	−.08	−.04	−.11
MSCEIT K	.06	.10	.08	.14
MSCEIT L	.13	.07	.25	.14
Open-Ended Maximum-Performance				
LEAS	.03	.12	.05	.19
Hybrid Method				
EM AP	−.11	−.03	−.21	−.06

* $p < .001$.
Note. These correlations were based upon a sample size of 134 for the factor scores, and between 141 and 143 for the other measures.
Determinations of the significance of the correlations corrected for attenuation due to lack of internal consistency depend upon the argument given on page 118.
EX GR = OGSI Expression Grouping. CAR PR = OGSI Cartoon Predictions. MS CAR = OGSI Missing Cartoons. SOC TR = OGSI Social Translations. LEAS = Levels of Emotional Awareness Scale. EM AP = TEIS Emotional Appropriateness.

Conclusions

Summary

Self-report measures of cognitive subcomponents of ESI and factor scores for those factors consisting largely of self-report measures were consistently correlated with Self-Deceptive Enhancement. In most cases the correlations with Self-Deceptive Enhancement were larger than the largest correlation with an intelligence composite, and in one case this difference reached statistical significance. It therefore appears that self-report questionnaires provide poor measurement of cognitive subcomponents of ESI. In contrast, maximum-performance measures of ESI were never correlated with Impression Management or Self-Deceptive Enhancement. Self-report measures of personality subcomponents of ESI were sometimes correlated with Impression Management and Self-Deceptive Enhancement, as was the case for the self-report measures of Big Five facets.

Relation of Results to My Original Hypotheses

Originally, I hypothesized that all self-report measures of ESI would be related to Impression Management, because Emotional Intelligence is discussed as being socially desirable. However, this was rarely the case. Instead, I found that self-report measures of ESI were often correlated with Self-Deceptive Enhancement, suggesting that people who see themselves as Emotionally and Socially Intelligent have overly positive self-perceptions. It is revealing that maximum-performance measures of ESI did not have significant correlations with Self-Deceptive Enhancement: it is therefore the perception of being Emotionally and Socially Intelligent and not actually being Emotionally and Socially Intelligent that is related to Self-Deceptive Enhancement. One possible interpretation of this finding is that ESI is one additional realm about which self-deceptive people are deceived.

Relation of Results to Previous Research

Previous research found conflicting results regarding the relation of self-report measures of cognitive subcomponents of ESI to SDR. Linden et al. (1996) found no relation between the TAS-20 and measures of Impression Management and Self-Deceptive Enhancement. However, Kroner and Forth (1995) found that the TAS-20 was negatively correlated with each of three factor scores from an early measure of SDR, and Robert Tett (personal communication, May 1999) found significant correlations with SDR for 8 of 10 subscales in an early version of his measure. I concluded that self-report measures of cognitive subcomponents of ESI are related to Self-Deceptive Enhancement, but are unrelated to Impression Management, using two TAS-20 subscales, three TEIS subscales, and one TMMS subscale. These results were found in a sample of undergraduates where results were kept completely confidential and were not used to make decisions about individuals, and different results might be found in different populations. Future research should further explore the relation of self-report measures of different aspects of ESI to different aspects of SDR.

No previous research had examined the relation of maximum-performance measures of ESI to SDR. Although no relation with SDR would be expected for multiple-choice tests, examination of possible relations for consensus scoring, the open-ended Levels of Emotional Awareness Scale, and the hybrid Emotional Appropriateness scale were needed.

Final Word

Self-report measures of cognitive subcomponents were consistently correlated with Self-Deceptive Enhancement. In contrast, maximum-performance measures of these same

constructs were never correlated with Self-Deceptive Enhancement or Impression Management. Maximum-performance tests are therefore to be preferred.

CHAPTER 7: SUMMARY AND IMPLICATIONS

This dissertation was designed to answer five research questions regarding Emotional and Social Intelligence (ESI). In the first section of this chapter, I briefly review my results. Next, I discuss the implications of my findings for theories of ESI and for test construction in this area. After these general conclusions, I detail my evaluation of the individual ESI measures used in this research. I conclude with a discussion of the limitations of these studies and with some final observations on ESI research.

Summary

The first question was "What are the dimensions that underlie ESI?" I examined 24 measures of cognitive subcomponents of ESI, and found four factors: (a) Emotion Perception, (b) Perceived Difficulties with Emotions, (c) Emotion Insight, and (d) Emotional Understanding of Others and Regulation of Emotion. Later analyses revealed that the second factor was highly correlated with Neuroticism, and that the last factor was highly correlated with Extraversion. Only the last three of these primary factors had salient pattern coefficients for the one factor that emerged in a higher-order factor analysis, and the communalities of each of the first-order factors were low.

My second research question was "Which ESI subcomponents are types of intelligence and which are personality dimensions?" I examined the relations of 31 measures of ESI with 4 intelligence composites, 5 personality composites, and 2 measures of Socially Desirable Responding (SDR). Eight of the eighteen maximum-performance measures of ESI demonstrated convergent validity (see pages 112 – 113) with the intelligence composites and discriminant validity from both the personality composites and the measures of SDR, and none of the maximum-performance measures demonstrated convergent validity with the personality dimensions. On the other hand, none of these tests (or the self-report measures) had significantly higher correlations with the cognitive domain than the personality domain. Thus, for no ESI measure studied was there compelling evidence that it measured a cognitive ability. Further work on refining the maximum-performance tests appears to be needed. In contrast, eleven out of thirteen self-report measures demonstrated convergent validity with personality composites, and discriminant validity from the intelligence composites. None of the self-report measures demonstrated convergent validity with the cognitive abilities, even though six of these tests appeared—based on item content—to measure cognitive subcomponents of ESI.

My third research question was "How are cognitive abilities of ESI related to the hierarchical structure of cognitive abilities?" I conducted a factor analysis of 24 measures of cognitive subcomponents of ESI and 12 intelligence tests. I found five factors: (a) Emotion Perception, (b) Fluid Intelligence, (c) Self-Reported Emotional Intelligence, (d) Verbal Ability and Emotion Insight, and (e) Verbal Closure. In the second-order factor analysis, two factors, representing Fluid and Crystallized Intelligence, emerged. Each of the first-order factors with salient pattern coefficients for ESI measures contributed to the Crystallized Intelligence factor, although the Emotion Perception factor and the Self-Reported Emotional Intelligence factor both had low communalities.

My fourth research question was "How are personality subcomponents of ESI related to the Big Five dimensions of personality?" I conducted separate factor analyses for men and women of 7 personality subcomponents of ESI and the 30 NEO-PI-R facets. For both men and women, I found that six of the seven ESI measures loaded on one factor, which I subsequently labeled Sensitivity. Most of these measures had secondary loadings on one or

more of the Big Five factors. The remaining measure—Empathic Concern—loaded on the same factor as Agreeableness, for both men and women.

My final research question was "To what extent are measures of ESI related to Socially Desirable Responding?" I found that self-report measures of cognitive aspects of ESI were consistently related to Self-Deceptive Enhancement, whereas maximum-performance tests of ESI were never related to either Self-Deceptive Enhancement or Impression Management. I therefore concluded that maximum-performance tests are to be preferred when attempting to measure cognitive subcomponents of ESI.

Implications for Theories of Emotional and Social Intelligence

The results of my dimensional analysis and the factor analysis of the ESI measures and the intelligence tests suggest that ESI does not represent a coherent higher-order construct, and that it may be more fruitful to focus future research and discussion at the level of factors, subcomponents, or individual measures. Although different researchers include different aspects of ESI in their research, results from a number of studies are now converging on the following six factors of measures of cognitive aspects of ESI: (a) Emotional Understanding, (b) Emotional Integration, (c) Emotion Perception, (d) Emotion Management, (e) Social Insight, and (f) Self-Reported Emotional Intelligence. Additional efforts to gather together and factor analyze data from a wide variety of ESI measures are needed, to determine if Emotional Integration is more closely associated with Emotional Understanding or Emotion Perception, to determine if Social Insight is distinct from Emotional Understanding, and to determine if Managing Emotions in the Self is distinct from Managing Emotions in Others. Repeated analyses of this sort may eventually lead to a clear agreed-upon definition of cognitive aspects of Emotional and Social Intelligence, and a listing of its subfactors. Parallel analyses of personality aspects of ESI are needed to clearly define personality variables associated with emotions and social relationships.

Based on the results of the first three analyses, I concluded that Emotion Perception is a new Primary Mental Ability, and has only weak relations with other types of intelligence. Emotion Insight also represents a Primary Mental Ability, but may be overly related to Verbal Ability. Based primarily on the second analysis, in which there was no evidence that self-report measures of ESI are tapping types of intelligence but ample evidence that they are measuring personality dimensions, I concluded that—although Self-Reported Emotional Intelligence consistently forms a coherent factor—neither these tests nor this factor should be considered to be a Primary Mental Ability.

Because the ESI measures that were included in this research are a unique selection of available measures, there is no guarantee that the Primary Mental Abilities tentatively identified in this research—Emotion Perception and Emotion Insight—are correct or exhaustive. Further research is needed to examine the relation of Emotion Insight to Verbal Ability, with which it was highly correlated. Additional factor analyses using measures selected to span the full range of ESI content and multiple measures of each of several different cognitive abilities—including Verbal Ability—are needed. Several such studies will be needed before we can be confident that we have identified each of the Primary Mental Abilities associated with ESI.

Other approaches should also be used to determine which aspects of ESI can justifiably be labeled as types of intelligence. Wechsler (1958) defined intelligence as "the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment" (p. 7). Building upon the last part of this definition,

one approach would therefore be to examine the relations between ESI measures and various types of success. Those variables that predict which people are the best therapists, arbitrators, negotiators, or managers, for example, could be considered as measuring types of intelligence that are related to emotional and social success. The results of this type of analysis may conflict with the results of construct validity and factor analytic studies, but information on the variables that are related to success in emotional or social situations may be precisely the information that is required by practitioners.

As demonstrated in my fourth analysis, most personality aspects of ESI appear to measure a coherent construct that falls largely outside the range of variables measured in the Big Five model of personality. It may be that the emergence of the Sensitivity factor is related to the on-going debate about the Intellect or Openness to Experience factor: the Feelings facet of Openness consistently made its strongest contribution to the Sensitivity factor (not the Openness factor), and would be included in measures of Openness to Experience but not of Intellect. A greater understanding of the Intellect or Openness to Experience factor is needed to determine if Sensitivity falls outside the range of concepts covered by the Big Five model. As well, because the personality subcomponents of ESI that I included represent a unique selection, replication of the existence of a Sensitivity factor is needed.

In conclusion it is clear that ESI is not a homogeneous construct. At the minimum, ESI can be divided into cognitive and personality components, and it is misleading to label personality subcomponents as types of intelligence. In addition, cognitive subcomponents of ESI can be further subdivided, and some—but not all—of these appear from this initial evidence to be Primary Mental Abilities and warrant the use of the word "Intelligence".

Implications for the Measurement of Emotional and Social Intelligence

Research from a number of studies (Bar-On, 1997b; Davies et al., 1998; Wong et al., 1995; and this study) is now converging on the conclusion that self-report measures of ESI provide poor measurement of cognitive abilities and that maximum-performance measures are to be preferred. This conclusion is based on four types of evidence.

First, maximum-performance measures are more likely than self-report measures to correlate with other cognitive abilities. In my research, 8 of the 18 maximum-performance measures and 0 of the 13 self-report measures correlated with at least one of the other cognitive abilities. Bar-On (1997b) also found low correlations between self-report measures of ESI and other intelligence tests. Spearman, Thurstone, and others have shown that cognitive ability measures are almost invariably positively correlated (Cattell, 1971; Thurstone, 1947). Therefore, the failure of some ESI measures to correlate positively and significantly with other intelligence tests suggests they are not measuring cognitive abilities.

Second, self-report measures are more likely to correlate with personality dimensions and to load on factors marked by personality measures. In my research, I found that 12 of the 13 self-report measures and 0 of the 18 maximum-performance measures had significant correlations with at least one personality dimension. In their first factor analysis, Davies et al. (1998) found that 6 of the 14 self-report ESI measures but 0 of the 4 maximum-performance ESI measures loaded on factors marked by personality dimensions. Hakstian and Cattell (1978) showed that cognitive abilities and personality dimensions have low intercorrelations, and so the frequent relations between self-report ESI measures and personality dimensions suggest that self-report ESI measures are not tapping cognitive abilities.

Third, self-report measures of ESI are more likely to correlate with Socially Desirable Responding (SDR). In my research, 9 of the 13 self-report measures but 0 of the 18 maximum-performance measures correlated with either Impression Management or Self-Deceptive Enhancement. This is important because intelligence tests both should not and typically do not correlate with SDR. Intelligence tests should not correlate with SDR, because this suggest that scores given on the intelligence tests might be misleading. As evidence that intelligence tests typically do not correlate with SDR, I offer the correlations between the twelve intelligence tests I used and the two measures of SDR: only 1 of these 24 correlations was statistically significant. Therefore, the correlations between self-report ESI measures and SDR suggest that the self-report measures are either not measuring cognitive abilities or are providing poor measurement.

Fourth, self-report measures may be more likely to form method factors in factor analytic studies. In my research, I found a method factor for Self-Reported Emotional Intelligence in the factor analysis of the 24 ESI measures and 12 intelligence tests. Wong et al. (1995) also reported the existence of a method factor for self-report measures of ESI. Neither of these two studies found method factors associated with the maximum-performance ESI measures.

Evidence is thus accumulating that suggests that maximum-performance tests are to be preferred, when attempting to measure cognitive aspects of ESI. Two caveats to this conclusion must be made. First, when attempting to measure personality subcomponents of ESI, self-report measures are likely adequate. I know of no research comparing self-report and other methods of measuring personality subcomponents of ESI (e.g., objective behavioural checklists, ratings by knowledgeable others, etc.) that has shown that self-report measures are inferior. Second, the conclusion of the inferiority of self-report measures is strongly influenced by the assumption that all cognitive abilities are positively correlated. If we define intelligence not as the combination of higher-order cognitive abilities (such as Fluid and Crystallized Intelligence), but instead as whatever leads to success in a specified environment, different subcomponents of ESI would likely be labeled as types of intelligence, and different instruments would be considered to be good measures of those constructs. It is quite probable that some subcomponents that I have labeled (or would label) as personality dimensions would predict success, and therefore that some self-report measures would be considered to be good measures of intelligence. My conclusion of the inferiority of self-report measures for the measurement of intelligence is thus dependent upon my criteria for intelligence.

My conclusion that maximum-performance measures are to be preferred does not imply that they are without problems. Some maximum-performance tests appear to be strongly related to Verbal Ability, and future test development should work to ensure that these tests are more closely related to other measures of ESI than to Verbal Ability, and that these tests can be distinguished from Verbal Ability in factor analytic studies.

Developing good maximum-performance measures of ESI is particularly difficult, in my opinion, because there are no agreed-upon world experts in ESI who can develop our tests and create the scoring keys. Some tests (e.g., the OGSI tests) have used the multiple-choice format, but creating items where one option is clearly correct and the others are clearly wrong could lead to items that are too easy. Because of this, this format may require relatively long tests to obtain adequate reliability. Improving multiple-choice tests of ESI may require the development and use of longer test forms.

Other tests (e.g., the MEIS and MSCEIT subscales) have used consensus scoring: your score is equal to the proportion of the norm group who gave that same response. This approach is difficult to justify conceptually, though: if a person was much more emotionally intelligent than the average person, they might pick a better answer than most people do, and therefore obtain a lower score. An alternative to the consensus approach would be to have experts develop the scoring key. Previous research with this approach has not been promising (Mayer et al., 2000), but perhaps what is needed is a very large group of experts. If several hundred ESI experts could be identified, then a person's score on a particular item could be the proportion of the expert group who gave that same response. Identifying ESI experts may not be as difficult as it initially sounds: if ESI is actually a subfactor of Crystallized Intelligence and increases with age, a large representative sample of people over 50 years of age should be adequate. Of course, such a scoring key would not be flawless: those 60-year-olds who are more intelligent than average may obtain lower scores than their less-intelligent neighbors on some items. However, this expert-consensus scoring key would in theory be preferable to the current consensus-scoring methods even for people who are over 50. Let us imagine that for a particular question, the most Emotionally and Socially Intelligent response is C. In the unselected norm group, few people recognize that C is the best response, so that responding with a C receives a score of .30. In the over-50 norm group, a larger portion of the respondents recognizes that C is the best response, so that responding with a C receives a score of .50. Because the proportion of the norm group who selected the ideal answer is higher using the over-50 norm group than using the unselected norm group, the score obtained by the most intelligent respondents would be higher using the over-50 norm group. This is even true for those items that are very difficult: if only 30% of the over-50 group selected the ideal answer, but only 10% of the unselected-norm group selected the ideal answer, higher scores would be obtained by the most Emotionally and Socially Intelligent respondents if the over-50 norm group was used. For individual items, the most intelligent people may still obtain lower scores, but this is less likely to occur when the over-50 norm group is used, and when scores are summed across items the most intelligent people are likely to obtain the highest scores overall. Improving tests based on consensus-scoring may therefore be quite straightforward, involving the use of expert norm-groups as well as traditional item selection procedures.

One of the ESI measures I studied uses an open-ended testing format, and I would like to discuss the possibilities of this format. The Levels of Emotional Awareness Scale (Lane et al., 1990) presents subjects with emotionally-evocative situations and asks them how they would feel. Responses are scored based on the structure of the response, not the content: stating that one would feel "good" or "bad" both receive the same low score because they both contain a single general emotion word; and stating that one would feel "surprised and happy" receives the same high score as stating that one would feel "depressed and fearful" because both contain multiple non-synonymous specific emotion words. The purpose of this test is to measure the depth and breadth of one's knowledge of emotion concepts, not their appropriateness to the situation. Therefore, even though one of the above responses might be quite unusual for a particular situation, if the emotional response is described clearly and in detail, a high score would be given.

Another assessment device that scores responses based on structural criteria was developed by Labouvie-Vief, DeVoe, and Bulka (1989). They created an interview schedule and scoring key to assess Emotional Understanding. Participants are asked to think about a

situation during the last month in which they felt particularly sad (angry, fearful, or happy), and to describe the cause, context, and course of their feelings. The highest scores for Emotional Understanding would be given to responses that integrate conventional or objective knowledge of emotions with the person's own unique subjective experience. For example, if the person described the similarities between the objective situation and the subjective experience (perhaps through the use of metaphor) they would obtain a high score. Responses are not scored based on the appropriateness of the emotion to the situation (e.g., feeling angry over a small disappointment) or the adaptiveness or social acceptability of the behavioural response to it (e.g., breaking objects); responses are scored solely based on the presence of specified structural criteria (e.g., presence of metaphors, or integration of subjective and objective experience). This scoring scheme allows much finer discriminations to be made among those with high levels of Emotional Understanding than is possible with the LEAS, because a wider range of structural criteria are used in the scoring process.

Scoring based on structural criteria rather than the content of the responses has an advantage over other approaches to scoring. With both multiple-choice and consensus scoring, the scoring key needs to be developed using people who are very Emotionally and Socially Intelligent, if very intelligent people are to obtain the highest possible score for each item. With scoring based on structural criteria, neither an extremely Emotionally Intelligent test designer nor an extremely intelligent norm group is needed. This makes it possible to acknowledge that a particular respondent is much more Emotionally and Socially Intelligent than the test designer. This is not possible in a multiple-choice test, for example, where the test designer specifies exactly what responses the participant has to give to obtain the highest possible score.

Scoring based on structural criteria may have a second advantage. It is possible that this scoring approach is less culturally biased than scoring based on content. It may be that there is more variability across cultures in the content of emotional knowledge than in the structure of emotional knowledge. For example, although metaphors for sadness may vary across cultures, a metaphoric description of sadness may represent a greater level of ESI than saying one feels "upset", regardless of the metaphor one uses.

On the other hand, scoring based on structural criteria does seem limited in terms of the range of ESI subcomponents that it can be used to assess. Structural scoring would be unable to assess the accuracy with which one identified others' emotions, for example. This approach seems well suited to assessing the complexity of one's knowledge, but less suited to assessing its accuracy.

New tests and interviews that score responses based on structural criteria should be developed. Research comparing the effectiveness of such techniques to the effectiveness of existing test formats will be needed.

Evaluation of Individual Measures of ESI

In this dissertation, I have accumulated quite a bit of information about individual measures of ESI. In this section, I will integrate that information to provide evaluations of these measures. Unlike my other conclusions, which are based on patterns of results gathered from a large number of statistical analyses, these conclusions were sometimes based on individual factor pattern loadings and correlation coefficients, and therefore must be considered more tentative.

Five criteria were considered in evaluating the quality of the ESI measures: (a) internal consistency of at least .60, (b) interpretability of the loadings obtained in the

dimensional analysis, (c) evidence from the second and third analyses that the instrument is measuring a cognitive ability, (d) evidence from the second and fourth analyses that the instrument is measuring a personality dimension, and (e) evidence from the fifth analysis that the instrument is not correlated with either Impression Management or Self-Deceptive Enhancement. Evidence for the satisfaction for these five criteria and a listing of the analyses that provided that evidence is given in Table 53.

When considering the measures of cognitive subcomponents, evidence of internal consistency was given relatively little weight. For a test to obtain the highest possible internal consistency, the people who obtain the highest scores overall should all receive the same high score on the individual items, and the people who obtain the lowest scores overall should all receive the same low score on each of the items. Because the people who would obtain the highest scores on the overall test—ESI experts—disagree about the correct answers, they would receive varying scores to the items. Therefore, the internal consistency of our measures can be expected to be lower than in an area where experts agree on the best answers. For all measurement, evidence of validity is more important than evidence of internal consistency, but this is especially true in the ESI area and other areas where experts disagree about the best responses.

MSCEIT Subscales

There was at least some evidence that each of the MSCEIT subscales measures a cognitive ability, but no evidence that they measure personality dimensions or are correlated with Socially Desirable Responding. Some refinement of these subscales seems warranted, however, as some of the internal consistencies were quite low. I recommend these subscales.

OGSI Tests

Like the MSCEIT subscales, each of the OGSI tests demonstrated at least some evidence that it measures a cognitive ability, but no evidence that it measures a personality dimension or is correlated with Socially Desirable Responding. Three of the four tests had low internal consistencies: these could be improved either by the use of the full length tests (I used only the first part of each test) or by item selection. These four tests are recommended.

TEIS Subscales

I used four TEIS subscales in my research. Each had a salient factor pattern coefficient on a factor that loaded on Crystallized Intelligence in the factor analysis in Chapter 4, providing some evidence that the subscales measure cognitive abilities. On the other hand, for two of these measures I also found at least some evidence that they measure personality dimensions, and three of these subscales were also correlated with Self-Deceptive Enhancement. Therefore, despite the careful work that went into the construction of these scales, I cannot recommend that they be used to measure cognitive aspects of ESI. On the other hand, these subscales had interpretable loadings on factors with other self-report measures of ESI, and had adequate levels of internal consistency. Further examination of these scales therefore appears warranted, to examine the constructs measured by these scales and their possible predictive validity.

Levels of Emotional Awareness Scale

I found consistent evidence that the Levels of Emotional Awareness Scale measures a cognitive ability, and no evidence that it measures a personality dimension or is correlated with Socially Desirable Responding. Although the five-item version of the LEAS that I used had relatively low internal consistency, this deficit can be easily remedied by using either the 10- or 20-item forms of this measure. This measure is recommended.

Table 53
Evaluation of Individual ESI Measures

Measure	Criteria				
	Adequate Internal Consistency	Interpretable Loading in Dimensional Analysis	Measures a Cognitive Ability	Measures a Personality Dimension	Not Correlated with SDR
Cognitive Subcomponents					
MSCEIT A Faces	0	1	3		5
MSCEIT B Synesthesia	0	1	3		5
MSCEIT C Blends		1	2, 3		5
MSCEIT D Progressions		1	2, 3		5
MSCEIT E Emotions in Relationships	0	1	2		5
MSCEIT F Landscapes	0	1	3		5
MSCEIT G Facilitation	0	1	3		5
MSCEIT H Transitions		1	2, 3		5
MSCEIT I Emotion Management	0		3		5
MSCEIT J Designs	0	1	3		5
MSCEIT K Sensation Translation	0	1	3		5
MSCEIT L Analogies		1	2, 3		5
OGSI Expression Grouping		1	2, 3		5
OGSI Missing Cartoons		1	2, 3		5
OGSI Cartoon Predictions		1	3		5
OGSI Social Translations	0	1	3		5
TEIS Recognition of Emotion in Others	0	1	3	2	
TEIS Regulation of Emotion in the Self	0	1	3		
TEIS Regulation of Emotion in Others	0	1	3	2	
TEIS Emotional Appropriateness					5
LEAS		1	2, 3		5
TAS-20 Difficulty Identifying Feelings	0	1	3	2	
TAS-20 Difficulty Describing Feelings	0	1	3	2	
TMMS Repair	0	1	3	2	

Table 53 con't

Measure	Criteria				
	Adequate Internal Consistency	Interpretable Loading in Dimensional Analysis	Measures a Cognitive Ability	Measures a Personality Dimension	Not Correlated with SDR
Positive Expressivity					
Positive Expressivity	0			2, 4	
Negative Expressivity					
Negative Expressivity	0			4	5
Attending to Emotions					
TMMS Attention	0			2	
Attending to Emotions	0			4	a
Emotion-Based Decision-Making					
TEIS Flexible Planning	0			2	5
Emotion-Based Decision-Making	0			4	a
Responsive Joy					
QSE Positive Sharing	0			2	5
Responsive Joy	0			4	a
Responsive Distress					
TEIS Empathy	0			2	5
Responsive Distress	0			4	a
Empathic Concern					
IRI Empathic Concern	0			2	
Empathic Concern	0			4	a

SDR = Socially Desirable Responding. LEAS = Levels of Emotional Awareness Scale.
a = the correlations of these newly-created scales with Socially Desirable Responding were not examined. Therefore, the absence of evidence of independence from Socially Desirable Responding for these scales should not be taken as evidence against them.
Note. The numbers in the above table refer to the analyses that provided the specified evidence: 0 = descriptive statistics (Chapters 2 and 5); 1 = dimensional analysis (Chapter 2); 2 = analysis of correlations with intelligence composites, personality composites, and Socially Desirable Responding measures (Chapter 3); 3 = factor analysis of 24 ESI measures and 12 intelligence tests (Chapter 4); 4 = factor analysis of 7 ESI measures and 30 NEO-PI-R facets (Chapter 5); 5 = correlations with Socially Desirable Responding (Chapter 6).

TAS-20 Subscales

Two of the three TAS-20 subscales were examined in this research. These measures had adequate internal consistencies, and loaded on the same factors as other self-report measures of ESI in each of the factor analyses. Unfortunately, they both appeared to measure personality dimensions and they both correlated with Socially Desirable Responding. One of the subscales—the Difficulty Identifying Feelings subscale—had a higher correlation with Self-Deceptive Enhancement than with any of the cognitive abilities. I therefore do not recommend that the TAS-20 subscales be used to measure types of intelligence. Rather, these subscales should continue to be considered as personality measures, which is how they are treated by researchers in the Alexithymia area.

TMMS Repair

The TMMS Repair subscale had adequate internal consistency, and loaded with other self-report measures of ESI in both of the factor analyses. However, this measure had a high negative correlation with Neuroticism, and correlated with Self-Deceptive Enhancement. Therefore, this subscale is not recommended as a measure of a type of intelligence. Further research on this subscale as a measure of Neuroticism may be warranted, and could examine its possible predictive validity.

Personality Measures

Five existing measures and seven newly-created measures were used to assess personality subcomponents of ESI. Each of these twelve measures had adequate internal consistency, and there was at least some evidence that they measured personality dimensions.

For five of the personality subcomponents of ESI, two different measures were used: an existing measure and a newly-created measure. In each of these cases, the internal consistency of the existing measure was equal to or greater than the internal consistency of the newly-created measure. This might have been expected because existing measures were created using item-analyses and item-level factor analyses, whereas the newly-created subscales have not been subjected to any procedures to maximize their internal consistencies. At this point, the existing measures are therefore recommended over the ones created here.

Two of the existing measures and one of the newly-created measures had significant, moderate correlations with either Impression Management or Self-Deceptive Enhancement: the Positive Expressivity Scale, TMMS Attention, and IRI Empathic Concern. For most of the newly-created measures, correlations with Socially Desirable Responding were not calculated. Therefore, these correlations do not provide evidence to prefer the newly-created measures to the existing measures. These correlations instead suggest that measures of these three constructs should be examined in terms of their relationships with Socially Desirable Responding, and steps should be taken to reduce these correlations in further revisions of these scales.

Limitations

These studies were subject to two potential limitations. One of these I have already mentioned: this research was based on a particular selection of ESI subcomponents. Other researchers in the ESI area have studied different combinations of these and other subcomponents. Neither the factors that resulted from my analyses nor theirs can be considered definitive. Our best evidence of the importance of particular factors is their replication.

In addition, the generalizability of my results may also be limited by the compositions of my samples. The UBC Student Sample was composed entirely of students, the majority of

whom were young and either White/Caucasian or Asian. The findings I obtained with this sample might not generalize to non-students, to older people, or to populations with different racial or cultural compositions. The Eugene-Springfield Community Sample consisted of somewhat older people, almost all of whom were Caucasian. The results obtained using that sample might not generalize to younger people or to other racial or cultural groups. The differences I found in the correlations of the personality subcomponents of ESI with the Big Five dimensions of personality could be due to differences in the composition of the two samples as well as to the sampling variability of correlation coefficients.

Difficulty in generalizing beyond the types of participants sampled is a limitation of all research. However, recent research in cultural psychology makes concerns about generalizations of emotion-related research findings to other cultural groups more salient. Some researchers (e.g., Ekman, 1972, 1999; Izard, 1971; Tomkins, 1962, 1963) argue that at least some emotions are universal, having distinctive antecedent events, subjective experiences, physiology, and expressive signals. Others (e.g., Kitayama & Markus, 1994; Mesquita & Frijda, 1992; Ellsworth, 1994) emphasize that there are both universal and culturally-specific emotion processes.

To clarify claims regarding cultural universality and specificity, I will first describe emotion processes in a very general way. I will then discuss evidence of cultural specificity, and how these cultural differences may affect scores on ESI measures, and could have influenced my research findings.

Although emotion theorists argue fervently about the nature of emotion, the following is a simplified model that is consistent with most emotion models [see Russell and Barchard (in press) for a more detailed discussion of this model]. The simplest emotional experiences will be called Objectless Affect. These include feeling good or bad, tired or excited. Objectless Affects are not related to any particular object or person, and have often been called moods. When a person perceives that a particular Object caused their Objectless Affect, they are now experiencing Attributed Affect. Feeling angry with someone, enjoying a TV show, and feeling jealous of one's spouse are all examples of Attributed Affect. Perception of Affective Quality represents a judgement of the capacity of a particular Object to cause affect. For example, we may perceive a sunset as relaxing, a movie as boring, or a friend as infuriating.

Affect often leads to Emotional Behaviour. Emotional Behaviour includes any observable behaviour associated with affect, such as visible signs of physiological responses, verbalizations, instrumental behaviour, and facial expressions. Emotional Episodes can be defined as the combination of Attributed Affect and Emotional Behaviour. Not all emotional experiences result in Emotional Episodes, because not all affect is associated with observable Emotional Behaviour.

Meta-awareness of one's emotional experience occurs when one becomes aware of feeling Objectless or Attributed Affect. Once the person is meta-aware of their affect, they can label it and decide if they want to change it. Management of Emotions occurs when one deliberately attempts to alter one's affect, by changing one's thoughts or behaviours. Almost everything we do has some influence upon our affect, and therefore only deliberate attempts to alter affect are labeled as Management of Emotions.

Finally, Emotion Scripts represent one's conceptual knowledge of emotions: one's knowledge of the causes, characteristics, and consequences of emotions. Like other knowledge, these scripts are learned and may be more or less accurate.

To what extent are emotion processes the same in different cultures? There is now substantial evidence that some types of Emotional Episode are commonly experienced in many diverse cultures (Ekman, 1999), but there is also substantial evidence that even some of the most common Emotional Episodes (e.g., fear, surprise, disgust) may not be universal (Ekman, 1999; Russell, 1994) and that some Emotion Scripts may be restricted to only a limited number of cultures or even a single culture (*amae* in Japan, Kumagai & Kumagai, 1985; *liget* in the Philippines, Rosaldo, 1980; *watjilpa* in Australia, Morice, 1977). Second, there appear to be similarities across cultures in the dimensions used to distinguish and label emotions (e.g., pleasantness versus unpleasantness; agency: self, other, or uncontrollable outside forces), but the attributions that are made for the same events vary across cultures and this may influence the frequency of some emotions (Ellsworth, 1994). For example, although anger in various cultures is associated with negative events that are perceived as caused by others (Ellsworth, 1994), the Utku Inuit rarely attribute negative events to the causal agency of others and rarely experience anger (Mesquita & Frijda, 1992). Given that different objects and situations seem to cause different emotions in different cultures, it seems reasonable to suppose that the Perception of the Affective Quality of an object or event may also vary from one culture to the next (Ellsworth, 1994). Lastly, variations in the acceptability of feeling and expressing certain emotions may lead to cultural differences in Emotional Behaviours and in the Regulation of Emotion. For example, anger is condemned among Utku Inuit (Briggs, 1970) but encouraged among some Arab groups (Abu-Lughod, 1986).

How could cultural differences influence scores on ESI measures? In the simplest case, responses to individual items may vary systematically between cultures: a landscape that appears relaxing to most members of one culture may be somewhat more threatening to members of another culture, or perceptions of the best thing to do in a certain interpersonal situation may differ across cultural groups. If a measure includes a substantial portion of content upon which there are important cultural differences, then scoring keys developed by or with one cultural group may result in low scores for other cultural groups. This possibility could be explored empirically by examining individual items for cultural bias. If bias exists, it could be eliminated by using culture-specific scoring keys or by concentrating item content on those emotion processes that seem most universal.

If cultural bias exists in the tests I used, this could have influenced the scores of minority group members in my two samples with consequent increases or decreases in the correlations among my variables (whether the correlations would have increased or decreased depends upon the proportion of minority group members in each sample and the relation among the hypothetical unbiased means of the various groups). If cultural biases are large, then the findings based on the UBC Student Sample (which had a large proportion of minority group members) might not generalize to other cultural groups. The similarities of the broad conclusions of this research with the conclusions of previous research suggest to me that such cultural biases are probably not large, but research is needed to empirically test the possible cultural-specificity of our ESI scoring keys.

A second possibility is that there may be cultural differences in the nature of ESI. Perhaps Emotion Scripts are so variable that the Primary Mental Abilities associated with ESI vary across cultures, or perhaps a particular ESI measure taps a cognitive ability in one cultural group, but a personality dimension in another. Given the commonalties found in Emotional Episodes (Ekman, 1999; Russell, 1994) and the dimensions of emotional

appraisals (Ellsworth, 1994) across various cultural groups, I am hopeful that the broad structure of ESI will be similar across cultures, even if the content varies somewhat.

Nevertheless, if there are cultural differences in the nature and structure of ESI, this may have had a pervasive influence upon my results (and the results of other ESI research). Replication of our studies in different cultural groups is the only method of detecting these possible differences. Cross-cultural replications of the structure of ESI, of the relation of ESI to cognitive abilities and personality dimensions, and of the validity of individual ESI measures will be needed.

Final Observations

If the many above suggestions for future research are followed, ESI researchers will—I hope—slowly develop an agreed-upon list of important concepts in this area and good maximum-performance tests to measure them. At that point—or perhaps before that point—researchers should apply themselves to developing theories of Emotional and Social Intelligence. At present, models of Emotional Intelligence and Social Intelligence consist of lists of skills, abilities, and personality characteristics. Few models provide justifications for the characteristics included, or describe expected relations among these characteristics. No current model of Emotional Intelligence or Social Intelligence is conceptually related to or derived from existing models of Intelligence or Emotion. At best, researchers sometimes state that Emotional or Social Intelligence is believed to be a subfactor of Crystallized Intelligence (or Fluid Intelligence, or both), and is therefore expected to behave as other subfactors of Crystallized Intelligence (or Fluid Intelligence) do.

The ESI area would benefit from theory development, because theory development would lead to hypotheses about the nature of ESI, and would drive research to improve the theory. The outline of one possible theory of ESI—based on current theories of emotion—is presented in Russell and Barchard (in press). Other approaches to developing a theory of ESI—such as evolutionary or sociological approaches, or by relating ESI to current theories of intelligence—could also be used.

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APPENDIX A

Abbreviations and Time to Complete the Measures Used

Abbreviations and Time to Complete

Measure	Abbreviation	Time
Measures of Emotional and Social Intelligence		
Emotional Intelligence		
The Trait Meta-Mood Scale	TMMS	6 min
33 Item Measure of Emotional Intelligence	33EI	5 min
Tett's Emotional Intelligence Scale	TEIS	24 min
Multifactor Measure of Emotional Intelligence	MEIS	60 min
Mayer-Salovey-Caruso Emotional Intelligence Test	MSCEIT	60 min
The Adjective Check List Interpretive Report	ACLIR	15 min
EQ-i	EQ-i	30 min
Style in the Perception of Affect Scale	SIPOAS	15 min
Gross and John's Expressivity Scale	GJES	11 min
Social Intelligence and Social Skills		
Social Skills Inventory	SSI	15 min
O'Sullivan and Guilford's Tests of Social Intelligence	OGSI	29 min
Chapin Social Insight Test	CSIT	13 min
Perceived Encoding Ability scale	PEA	3 min
Perceived Decoding Ability scale	PDA	3 min
Empathy		
Balanced Emotional Empathy Scale	BEES	5 min
Interpersonal Reactivity Index	IRI	5 min
A Quick Scale of Empathy	QSE	5 min
Alexithymia		
Toronto Alexithymia Scale - 20	TAS-20	5 min
Levels of Emotional Awareness Scale	LEAS	15 min
New Measures		
Positive Expressivity Scale		2 min
Negative Expressivity Scale		2 min
Attending to Emotions		2 min
Emotion-Based Decision-Making		2 min
Responsive Joy		2 min
Responsive Distress		2 min
Empathic Concern		2 min

Measure	Abbreviation	Time
Measures of Other Variables of Interest		
Big Five		
International Personality Item Pool	IPIP	
IPIP Measures of 23 Facets with 8 items each		31 min
IPIP Measures of the Big Five with 10 items each		8 min
Socially Desirable Responding	SDR	
Paulhus Deception Scales: The Balanced Inventory of Desirable Responding-7 Impression Management and Self-Deceptive Enhancement subscales	PDS-BIDR-7 IM and SDE subscales	6 min
Demographics and English Language Proficiency		1 min for all 4
Age		
Sex		
Ethnicity		
English Language Proficiency		

Note. Where no subject times were given in the source materials, time was estimated based on the assumption that six self-report likert-type items could be completed in one minute. For information on the time to complete measures included in the Cognitive Battery, see Appendix C.

APPENDIX B

Measures of Emotional and Social Intelligence

Measures of Emotional and Social Intelligence

The following measures of ESI are described in this appendix:

Emotional Intelligence
- The Trait Meta-Mood Scale (TMMS)
- 33 Item Measure of Emotional Intelligence (33EI)
- Tett's Emotional Intelligence Scale (TEIS)
- The Adjective Check List Interpretive Report (ACLIR)
- The Multifactor Measure of Emotional Intelligence (MEIS)
- The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)
- EQ-i
- Style in the Perception of Affect Scale (SIPOAS)
- Gross and John's Expressivity Scale (GJES)

Social Intelligence and Social Skills
- Social Skills Inventory (SSI)
- O'Sullivan and Guilford's Tests of Social Intelligence (OGSI)
- Chapin Social Insight Test (CSIT)
- Perceived Encoding Ability (PEA) and Perceived Decoding Ability (PDA)

Empathy
- Balanced Emotional Empathy Scale (BEES)
- Interpersonal Reactivity Index (IRI)
- A Quick Scale of Empathy (QSE)

Alexithymia
- Toronto Alexithymia Scale-20 (TAS-20)
- Levels of Emotional Awareness Scale (LEAS)

New Measures
- Positive Expressivity Scale (PES)
- Negative Expressivity Scale (NES)
- Attending to Emotions
- Emotion-Based Decision-Making
- Responsive Joy
- Responsive Distress
- Empathic Concern

Measures of Emotional Intelligence

The Trait Meta-Mood Scale (TMMS)

The TMMS (Salovey et al., 1995) is a 30-item self-report measure of "people's tendency to attend to their moods and emotions, [to] discriminate clearly among them, and [to] regulate them" (p. 128.) It has three subscales: Attention (11 items), Clarity (13 items), and Repair (6 items). Estimates of the internal consistencies of the scales range from .62 to .83 (Davies et al., 1998; Salovey & Mayer, 1995). An example item from the Attention subscale is "I pay a lot of attention to how I feel." An example item from the Clarity subscale is "I am rarely confused about how I feel." An example item from the Repair subscale is "I try to think good thoughts no matter how badly I feel." The Attention and Repair subscales were used in my research.

33 Item Measure of Emotional Intelligence (33EI)

The 33EI (Schutte et al., 1998) is a 33-item self-report measure of Emotional Intelligence, based on the original model of Emotional Intelligence proposed by Salovey and Mayer (1990). To develop the 33EI, 62 items were given to a sample of 346 students and individuals from diverse community settings in a metropolitan area in the southeastern United States. Four factors emerged from a principal-components analysis. The thirty-three items that loaded above .4 on the first factor represented all portions of the Salovey and Mayer's (1990) model, and were selected for inclusion on the final scale. The scale requires a fifth grade reading level, uses a five-point likert rating scale, and is easily hand-scored. The reliability of this scale appears to be good: using a sample of 32 college students, coefficient alpha was estimated as .87; and test-retest reliability over two weeks was .78 for a sample of 28 college students.

Tett's Emotional Intelligence Scale (TEIS)

Tett and his associates (Tett, Wang, Fisher et al., 1997; Tett, Wang, Gribler, & Martinez, 1997) designed a multi-dimensional measure of Emotional Intelligence, which gives scores for twelve separate subscales and an Infrequency scale. The first ten subscales cover the four areas outlined in Salovey and Mayer's (1990) original model: Emotional Appraisal, Emotional Expression, Regulation of Emotion, and Utilization of Emotion. The eleventh and twelfth subscales were added later. More information about the subscales is given in Table B1 below.

The Adjective Check List Interpretive Report (ACLIR)

The ACLIR (Measurement and Planned Development, 1998) was created using existing subscales of the Adjective Check List (Gough, 1960) to measure the different components of Goleman's (1995) model of Emotional Intelligence. The ACLIR provides measures of self-reported standing on each of eight hierarchically-arranged components: Self-awareness, Motivation (including Optimism, Impulse-Control, and Persistence), and Interpersonal (including Empathy and Social Skill). The ACLIR is available at a 75% discount for researchers, with the remaining 25% refundable upon publication. This results in a refundable cost of approximately $3 per subject scored.

The Multifactor Measure of Emotional Intelligence (MEIS)

The MEIS (Mayer et al., 2000) was the first maximal-performance test of Emotional Intelligence based directly on the ability of model of Emotional Intelligence outlined in Mayer and Salovey (1997). The twelve subtests are grouped into four branches: Perceiving Emotions, Assimilating Emotions, Understanding Emotions, and Managing Emotions. More information about the subtests is given in Table B2.

Table B1
Definitions and Example Items for Tett's 12 subscales

Dimension	Definition	Sample Items
Emotion in the Self—Verbal	The degree to which one is in touch with one's feelings and can describe those feelings in words	T I am rarely at a loss for words when I want to express my emotions. F It's hard for me to know what I really feel.
Emotion in the Self—Nonverbal	The communication of one's feelings to others through bodily (i.e., nonverbal) expression	T Emotionally, I am very easy to read. F People sometimes tell me I look mad when I'm not.
Recognition of Emotions in Others	The ability to detect and understand others' feelings	T I am good at "reading" the inner feelings of others even if I don't know them very well. F I am often not the best judge of character.
Empathy	Being concerned with and affected by others' feelings	T When I see people crying, sometimes I can almost feel their sadness. F Other people's suffering doesn't affect me very much.
Regulation of Emotion in the Self	The ability to control one's feelings	T I can keep myself calm even in highly stressful situations. F I think my biggest problem is my inability to control my emotions.
Regulation of Emotion in Others	The ability to influence others' emotions	T Usually, I know what it takes to turn someone else's boredom into excitement. F I don't think I'm very good at persuading other people.
Flexible Planning	A preference to base life decisions on feelings over logic	T How I feel is most important when it comes to making plans. F Good long-term planning should be based on sound reasoning rather than feelings.
Creative Thinking	Being creative	T I have an inventive mind. F I am not a very creative person.
Mood Redirected Attention	A capacity to attend to information about the self when powerful—usually negative—emotions occur	T Having strong emotions forces me to understand myself. T Tough times really help you know your true values.
Motivating Emotions	Motivation in the pursuit of one's goals, including both optimism and perseverance	T I am a self-motivated person. F If things don't come easy, I give up.
Delay of Gratification	The ability to forgo immediate reward by focusing on an even greater reward in the future	T I would rather save the money I earn than spend it. F If I were on my way home and saw something in a store window I wanted, I would stop and buy it.
Emotional Appropriateness	The ability to differentiate between similarly experienced emotions, e.g., fear versus anger	T Getting robbed would make me nervous. F It would be exciting to be in a car accident.

Table B2
Subscales of the MEIS

Subscale	Description
Perceiving Emotions	
Faces	Eight faces chosen to represent a variety of emotions are each followed by six emotions (*happiness*, *anger*, *fear*, *sadness*, *disgust*, and *surprise*), which are each rated on a five point scale, ranging from "Definitely Not Present" (1) to "Definitely Present" (5).
Music	Eight 5-10 second original pieces of music are rated on each of the above six emotions, using the five point scale described above.
Designs	Eight graphic designs are rated on each of the six emotions, using the five-point scale.
Stories	Six passages are each rated on a seven-adjective mood scale using the five point ratings. For each story, the adjectives were selected to balance those that were applicable to the story with those that were not, and to balance those that were positively versus negatively-toned.
Assimilating Emotions	
Synesthesia	For each of six stimuli, subjects rate their parallels to other sense modalities, including warmth, touch, and color. People imagined an event that could make them feel a particular feeling, and then described their feelings using ten separate five point semantic-differential scales (e.g., warm 1 2 3 4 5 cold).
Feeling Biases	For each of four passages, subjects indicate how moods influence how they feel toward a fictional person, at that moment. For each passage, seven relevant traits are rated on a five-point scale: "Definitely Does Not Describe" (1) to "Definitely Does Describe" (5).
Understanding Emotions	
Blends	Eight multiple-choice items assess subject's ability to analyze blended or complex emotions.
Progressions	Eight multiple choice items assess subjects understanding of how emotional reactions proceed over time, with an emphasis on intensification of feelings.
Transitions	Four passages assess people's understanding of how emotions (and situations) follow upon one another. For each, six alternative feelings were rated on a five point scale: "Extremely Unlikely" to have occurred (1) to "Extremely Likely (5).
Relativity	Four situations describe conflictual social encounters between two characters. Subjects rate the feelings of both characters on five emotional reactions (which have been designed for their relevance to the situation), using a five-point scale: "Extremely Unlikely" (1) to "Extremely Likely" (5).
Managing Emotions	
Managing Feelings of Others	For each of six situations, subjects evaluate four possible courses of action, in terms of effectiveness: "Extremely Ineffective" (1) to "Extremely Effective (5).
Managing Feelings of Self	For each of six situations, subjects evaluate the effectiveness of four possible responses, using the above five-point scale.

Alternative methods of scoring the MEIS are available, but as explained in the introduction, consensus scoring is preferred. In consensus scoring, each participant response is scored according to the proportion of the participant group who endorsed the selected alternative. Thus, if 10% of the norm group selected option A for an item (for example, anger is "Definitely Not Present", the subject would obtain a score of .10 for selecting A ("Definitely Not Present"); if 28% of the norm group selected option B, the subject would obtain a score of .28 for selecting B.

The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)

The MSCEIT (Mayer, Salovey, & Caruso, 1999) is a maximal-performance measure of Emotional Intelligence, based on a view of Emotional Intelligence as the capacity to reason with emotional information. Like the MEIS (Mayer, Salovey, & Caruso, in press) that preceded it, the MSCEIT is based on the four-branch model outlined in Mayer and Salovey (1997). The 12 subtests of the MSCEIT are organized into these four branches, as shown in Table B3. Six of these consist of new, experimental item types, whereas the remaining six have been adapted from subscales of the MEIS. In total, the MSCEIT has 294 items, and is more than 25% shorter than its predecessor, the MEIS.

Like the MEIS, the MSCEIT uses a procedure known as consensus scoring: for each item, subjects receive a score equal to the proportion of the norm group who selected that same response option. Thus, if 27% of the norm group answered A to question 12, then a respondent who selected A for item 12 would receive a score of .27 for that item.

The MSCEIT is currently undergoing a fairly extensive norming effort (involving at least 15 sites). The internal consistencies of the 12 subscales are as follows: .79, .80, .58, .50, .78, .85, .82, .57, .81, .82, .74, and .37, respectively (John Mayer, personal communication, July 2000).

EQ-i

The EQ-i (Bar-On, 1997b, 1997a) is a 133-item self-report measure that includes subscales for each of 15 components and composite scores for each of five domains. The 15 components are arranged hierarchically in Table B4, and defined in Table B5. The test also includes four validity indicators: omission rate, inconsistency index, and measures of positive and negative impression. Both raw scores and scores that have been corrected for positive and negative impression are reported.

Style in the Perception of Affect Scale (SIPOAS)

The SIPOAS (Bernet, 1996) is a 93-item ipsative measure of personal preferences for each of three approaches to emotions: BB (Based on Body), EE (Emphasis on Evaluation), LL (Looking to Logic). The BB scale measures the construct of "Being in Touch With One's Feelings", and is considered an indicator of Emotional Intelligence and a prerequisite for Social Intelligence. The SIPOAS is available from Michael Bernet for a cost of $0.20 per form.

Table B3
Subscales of the MSCEIT

Branch	Subscale	Description
Emotional Perception	Section A Faces	Five faces chosen to represent a variety of emotions are each followed by seven emotions (happiness, sadness, fear, anger, surprise, disgust, excitement), which are each rated on a five point scale, ranging from "No" (1) to "Extremely" (5).
	Section F* Landscapes	Five landscape pictures are rated on each of seven emotions (*happiness, sadness, fear, anger, surprise, disgust, excitement*) using a five-point scale.
	Section J Designs	Five graphic designs are rated on each of the seven emotions (*happiness, sadness, fear, anger, surprise, disgust,* and *excitement*), using the five-point scale.
Emotional Integration	Section B* Synesthesia	For each of five items, an emotion is described and subjects are asked to rate the similarity of that emotion to five other sensations, including warmth, touch, and color. Each sensation is rated from 1 "Not Alike" to 5 "Very Much Alike"
	Section G* Facilitation	For each of seven situations, subjects are asked to rate each of five emotions (different for each situation) for their helpfulness. Each emotion is rated on a five-point scale where 1 represents "Definitely Not Useful" and 5 represents "Definitely Useful".
	Section K* Sensation Translation	Five complex physical sensations are rated in terms of their similarity to five emotions (different for each item) using a five-point scale were 1 represents "Not Alike" and 5 represents "Very Much Alike".
Emotional Understanding	Section C Blends	Thirteen multiple-choice items assess subject's ability to analyze blended or complex emotions.
	Section D Progressions	Twelve multiple choice items assess subjects understanding of how emotional reactions proceed over time, with an emphasis on intensification of feelings.
	Section H Transitions	Twelve passages assess people's understanding of how emotions change as situations change. For each, two emotions are given in the item stem. The subject must choose the situation (from five alternatives) that accounts for the change in emotions.
	Section L* Analogies	For each of twelve items, an analogy between two emotions is given. Five possible emotion analogies are given as responses. Subjects choose the analogy that captures the same relation as the analogy given.
Emotional Management	Section E* Emotions in Relationships	For each of five situations, subjects evaluate five possible courses of action, in terms of effectiveness: "Extremely Ineffective" (1) to "Extremely Effective (5).
	Section I Emotion Management	For each of six emotionally-charged situations, subjects evaluate the effectiveness of five possible actions, using a five-point rating scale where 1 represents "Very ineffective" and 5 represents "Very effective".

* Experimental Tasks

Table B4
Domains of EQ

Domain	**Component**
Intrapersonal Components	Emotional Self-Awareness
	Assertiveness
	Self-regard
	Self-actualization
	Independence
Interpersonal Components	Empathy
	Social Responsibility
	Interpersonal Relationship
Adaptability Components	Reality Testing
	Flexibility
	Problem Solving
General Mood Components	Optimism
	Happiness
Stress Management Components	Stress Tolerance
	Impulse Control

Table B5
Definitions of the 15 Components of EQ Measured by the EQ-i

Component	Definition
Emotional Self-Awareness	The ability to be aware of and understand one's feelings.
Assertiveness	The ability to express feelings, beliefs, and thoughts and defend one's rights in a nondestructive manner.
Self-regard	The ability to be aware of, understand, accept, and respect oneself.
Self-actualization	The ability to realize one's potential capacities and to do what one can do, wants to do, and enjoys doing.
Independence	The ability to be self-directed and self-controlled in one's thinking and actions and to be free of emotional dependency.
Empathy	The ability to be aware of, to understand, and to appreciate the feelings of others.
Social Responsibility	The ability to demonstrate oneself as a cooperative, contributing, and constructive member of one's social group.
Interpersonal Relationship	The ability to establish and maintain mutually satisfying relationships that are characterized by emotional closeness, intimacy, and by giving and receiving affection.
Reality Testing	The ability to assess the correspondence between what is emotionally experienced and what objectively exists.
Flexibility	The ability to adjust one's emotions, thoughts, and behavior to changing situations and conditions.
Problem Solving	The ability to identify and define problems as well as to generate and implement potentially effective solutions.
Stress Tolerance	The ability to withstand adverse events, stressful situations, and strong emotions without "falling apart" by actively and positively coping with stress.
Impulse Control	The ability to resist or delay an impulse, drive, or temptation to act, and to control one's emotions.
Optimism	The ability to look at the brighter side of life and to maintain a positive attitude, even in the face of adversity and negative feelings.
Happiness	The ability to feel satisfied with one's life, to enjoy oneself and others, and to have fun and express positive feelings.

Gross and John's Expressivity Scale (GJES)

The GJES (Gross & John, 1999) is a 62-item scale that measures five aspects of Emotional Expressivity: Expressive Confidence, Positive Expressivity, Negative Expressivity, Impulse Intensity, and Masking. The subscales were developed by a factor analysis of existing measures of Emotional Expressivity and Emotional Intensity. The GJES was not designed as a measure of Emotional Intelligence, but does provide measurement of two aspects of the personality side of ESI: Positive Expressivity and Negative Expressivity. These two subscales have 13 and 11 items, respectively, and have internal consistencies of .85 and .72. Many of the items on each of these scales appear to be measures of Emotional Intensity.

Measures of Social Intelligence and Social Skills

Social Skills Inventory (SSI)

The Social Skills Inventory (Riggio, 1989) is a 90-item self-report measure of six different domains of social communication skills. Each scale is measured by 15 items. Additional information about the subscales is given in Table B6. The two-week test-retest reliabilities of the subscales have been estimated as ranging from .86 (for social sensitivity) to .96 (for social expressivity), using a sample of 40 subjects. Internal consistencies of the subscales range from .62 to .87.

O'Sullivan and Guilford's Tests of Social Intelligence (OGSI)

O'Sullivan and Guilford (1976) developed a series of tests to measure six different behavioral-cognition abilities. The four most successful of these tests are Expression Grouping, Missing Cartoons, Social Translations, and Cartoon Predictions. These tests are believed to measure the abilities to understand behavioral classes, systems, transformations, and implications, respectively. Each of these tests has two separately-timed parts and only the first part was used in my research. See Table B7.

Chapin Social Insight Test (CSIT)

The CSIT (Chapin, 1942) was designed "to assess the perceptiveness and accuracy with which an individual can appraise others and forecast what they might say and do" (Gough, 1993, p. 3), and was edited in 1993 to remove gender bias. The test consists of 25 situational items, each of which has four response alternatives. Correct answers receive weights of 1, 2, or 3, depending upon the item.

Perceived Encoding Ability scale (PEA) and Perceived Decoding Ability scale (PDA)

The PEA and PDA (Zuckerman & Larrance, 1979) are two paper-and-pencil measures of perceived ability to communicate nonverbally. For each construct, full length scales (with 49 and 46 items, respectively) and two equivalent short forms (with 16 items each) were constructed.

Measures of Empathy

Balanced Emotional Empathy Scale (BEES)

The BEES (Mehrabian, 1996, 1999) is a 30-item self-report measure of Emotional Empathy, where Emotional Empathy is defined as "one's vicarious experience of another's emotional experience" (Mehrabian, 1999). Each item is rated using a 9-point agreement-disagreement scale. The BEES yields a single total score, and has an internal consistency of .87 (Mehrabian, 1996).

Table B6
The Subscales of the Social Skills Inventory

Subscale	**Definition**	**Example Item**
Emotional Expressivity	Ability to accurately express felt emotion	I am able to liven up a dull party.
Emotional Sensitivity	Ability to interpret the nonverbal communication of others, as well as tendency to become emotionally aroused by others	I sometimes cry at sad movies.
Emotional Control	Ability to control and regulate emotional and nonverbal displays	I am easily able to make myself look happy one minute and sad the next.
Social Expressivity	Skill in verbal expression and the ability to engage others in social discourse	When telling a story, I usually use a lot of gestures to help get the point across.
Social Sensitivity	Ability to interpret the verbal communication of others, as well as sensitivity to and understanding of social norms	Sometimes I think that I take things other people say to me too personally.
Social Control	Skill in role-playing and social self-presentation	I am usually very good at leading group discussions.

Table B7
O'Sullivan and Guilford Social Intelligence Measures

Tests	**Description**
Expression Grouping	This test measures the ability to abstract common attributes from behaviour or expressive stimuli. Each item consists of a group of three line drawings of facial expressions, hand gestures, and body postures that show some thought, feeling or intention. Subjects select one of four alternative drawings of expressions that below with the given group of expressions.
Missing Cartoons	This test measures understanding of behaviour relationships. Each item presents a series of four cartoons that tells a story. One of these cartoons is missing, and must be selected from among a set of four alternatives.
Social Translations	This test measures the ability to recognize changes in behavioural meaning based on context. The subject is given a verbal statement that is exchanged between two people. The subject must then choose one of three alternative pairs of people between whom the same verbal statement would have a different meaning.
Cartoon Predictions	This is a test of the ability to predict behaviour consequences. For each item, a cartoon depicts an interpersonal situation. The subject must choose one of three alternative cartoons to show what is most likely to happen next.

Interpersonal Reactivity Index (IRI)

The Interpersonal Reactivity Index (Davis, 1980, 1983) is a 28-item self-report measure consisting of four 7-item subscales: Perspective-taking, Fantasy, Empathic Concern, and Personal Distress. The internal consistencies of the subscales range from .70 to .78, and the two-month test-retest reliabilities range from .61 to .81 (Davis, 1980). More detailed information about the subscales is given in Table B8.

A Quick Scale of Empathy (QSE)

The QSE (Caruso & Mayer, 1999) is a 30-item scale measuring six factors. More information on the subscales is given in Table B9.

Measures of Alexithymia

Toronto Alexithymia Scale - 20 (TAS-20)

The Toronto Alexithymia Scale (Taylor et al., 1985) consists of 26 self-report items, with a five-point Likert rating format. The 1994 revision of this test, the TAS-20 (Bagby, Parker, & Taylor, 1994; Bagby, Taylor, & Parker, 1994), consists of 20 items. These items form three subscales: Difficulty Identifying Feelings (7 items, 0 reverse-scored), Difficulty Describing Feelings (5 items, 1 reverse-scored), and Externally-Oriented Thinking (8 items, 5 reverse-scored). Coefficient alpha for the three subscales are given as .81, .75, and .64, respectively, for a psychiatric sample, and .79, .75 and .66 for a student sample (Bagby, Parker, & Taylor, 1994). Three-week test-retest reliability for the TAS-20 is estimated as .77 for a sample of 72 students.

An example item for the Difficulty Describing Feelings subscale is "It is difficult for me to find the right words for my feelings." An example of the Difficulty Identifying Subscale items is "I am often confused about what emotion I am feeling." An example item from the Externally-Oriented Thinking subscale is "I prefer talking to people about their daily activities rather than their feelings." Only the first two subscales were used in my research.

Levels of Emotional Awareness Scale (LEAS)

The LEAS (Lane et al., 1990) consists of 20 emotionally-evocative interpersonal situations, and asks subjects to describe the emotional responses of the self and the other person involved. Responses are scored based on structural criteria, so that higher scores indicate greater differentiation and integration of emotion-related constructs. Two short forms, consisting of 10 items each, are also available.

New Measures

Positive Expressivity Scale (PES)

The PES is a new 10-item measure with 5 positively-keyed and 5 negatively-keyed items. It was developed to provide an uncontaminated measure of Positive Expressivity, due to limitations of existing Expressivity measures. Existing measures of Expressivity tend to include both positive and negative emotions (e.g., TEIS Emotional Expression Subscale; Tett, Wang, Gribler, & Martinez, 1997) or to include Emotional Intensity as well as Positive Expressivity (e.g., GJES Positive Expressivity Subscale; Gross & John, 1999). The items of the PES are written in IPIP format, and are given below. One of the PES items, "Express my affection physically", is an item that has been borrowed from the public-domain International Personality Item Pool. It is labeled item H24. The remaining items are original.

Table B8
Subscales of the Interpersonal Reactivity Index

Subscale	**Definition**	**Example Item**
Fantasy	The tendency to imaginatively transpose oneself into fictional situations	Becoming extremely involved in a good book or movie is somewhat rare for me. (reversed)
Perspective-taking	The ability or proclivity to shift perspectives when dealing with other people	I sometimes try to understand my friends better by imagining how things look from their perspective.
Empathic Concern	The degree to which the respondent experiences feelings of warmth, compassion, and concern for the observed individual	I would describe myself as a pretty soft-hearted person.
Personal Distress	The individual's own feelings of fear, apprehension, and discomfort at witnessing the negative experiences of others	In emergency situations, I feel apprehensive and ill-at-ease.

Table B9
The Six Subscales of the Quick Scale of Empathy

Subscale Name	**Sample Item**	**Number of Items**	**Coefficient Alpha**
Empathic Suffering	I get very upset when I see a young child who is being treated meanly.	8	.80
Positive Sharing	Seeing other people smile makes me smile.	5	.71
Responsive Crying	I cry easily when seeing a sad movie.	3	.72
Avoidance	I rarely take notice when people treat each other warmly. (reversed)	4	.73
Feeling for Others	If someone is upset, I get upset too.	3	.59
Crowd Sympathy	If a crowd gets excited about something, so do I.	2	.44
Total Score		30	.88

Negative Expressivity Scale (NES)

The NES is a new 10-item measure with 5 positively-keyed and 5 negatively-keyed items. It was developed to provide an uncontaminated measure of Negative Expressivity, due to limitations of existing Expressivity measures, described above. The items of the NES are written in IPIP format, and are given on below.

Attending to Emotions Scale

Attending to Emotions is a new 10-item measure, with 5 positively-keyed and 5 negative-keyed items. It was modeled on the TMMS Attention subscale, to measure the tendency to pay attention to one's emotions. It was created solely to facilitate administration of this scale in the Eugene-Springfield Community Sample. The items of the Attending to Emotions scale consist of 3 existing IPIP items and 7 new items, and are given below.

Emotion-Based Decision-Making Scale

Emotion-Based Decision-Making is the tendency to make important life decisions based upon emotions, rather than using logic. The Emotion-Based Decision-Making scale is a 10-item measure with 5 positively-keyed and 5 negatively-keyed items. This scale was modeled after the TEIS Flexible Planning subscale, and was created solely to facilitation administration in the Eugene-Springfield Community Sample. Three existing IPIP items were used, and 7 new items were written. The complete scale is given below.

Responsive Joy Scale

Responsive Joy is the tendency to feel positive emotions when in the presence of other people who are feeling positive emotions. The Responsive Joy subscale consists of 6 positively-keyed items and 4 negatively-keyed items, and was modeled on the QSE Positive Sharing Subscale. The Responsive Joy subscale was created for two reasons. First, creation of this subscale facilitated administration in the Eugene-Springfield Community Sample. Second, the only existing measure of this construct (the QSE Positive Sharing subscale) consists of only 6 items, none of which were reverse-coded. This scale was therefore created in an attempt to sample the construct more thoroughly. All 10 items were written specifically for this subscale (no existing IPIP items appeared to measure this construct), and are given below.

Responsive Distress Scale

Responsive Distress is the tendency to feel negative emotions when in the presence of others who are feeling negative emotions. The Responsive Distress subscale consists of 10 items, half of which are reverse-coded. This scale was modeled after items from the TEIS Empathy subscale, the QSE Empathic Suffering, Responsive Crying, and Feeling for Others subscales, and the IRI Responsive Distress subscale. This scale was created solely to facilitate administration in the Eugene-Springfield Community sample. Five of the items were existing IPIP items, and the remaining five are new items. The entire scale is given below.

Empathic Concern Scale

Empathic Concern is the tendency to feel concern or sympathy for those who suffer. Empathic Concern is different from Responsive Distress, in that the focus remains on the other person. The Empathic Concern scale consists of 10 items, half of which are reverse-coded. Eight of the items used were existing IPIP items: only 2 new items were written. This scale was modeled after the IRI Empathic Concern subscale, and was created solely to facilitate administration in the Eugene-Springfield Community Sample. The complete Empathic Concern scale is given below.

Positive Expressivity

Item #	Item
H24	Express my affection physically
B005	Laugh out loud is something is funny
B079	Hug my close friends
B007	Express my happiness in a childlike manner
B139	Show my feelings when I'm happy
B048	Sometimes laugh out loud when reading or watching TV
B132	Have difficulty showing affection
B059	Have a quiet laugh
B084	Keep my happy feelings to myself
B004	Find it difficult showing people that I care about them

Negative Expressivity

IPIP #	Item
B080	Suspect that my facial expression give me away when I feel sad
B003	Shout or scream when I'm angry
B054	Show my fear
B101	Show my sadness
B014	Can't help but look upset when something bad happens
B066	Rarely show my anger
B010	Keep my feelings to myself, regardless of how unhappy I am
B130	Keep my feelings to myself, regardless of how scared I am
B012	Find it difficult showing people that I'm angry with them
B028	Wish I could more easily show my negative feelings

Attending to Emotions

IPIP #	Item
B116	Pay a lot of attention to my feelings
B122	Am usually aware of the way that I'm feeling
B033	Think about the causes of my emotions
B134	Notice my emotions
B142	Often stop to analyze how I'm feeling
E9	Am not in touch with my feelings
X183	Often ignore my feelings
X10	Rarely notice my emotional reactions
B087	Rarely think about how I feel
B106	Rarely analyze my emotions

Emotion-Based Decision-Making

IPIP #	Item
X199	Listen to my heart rather than my brain.
B069	Plan my life based on how I feel
B026	Base my goals in life on inspiration, rather than logic
B015	Listen to my feelings when making important decisions
B124	Believe emotions give direction to life
H378	Listen to my brain rather than my heart
X4	Rarely consider my feelings when making a decision
B097	Plan my life logically
B006	Believe important decisions should be based on logic
B113	Make decisions based on facts, not feelings

Responsive Joy

IPIP #	Item
B063	Feel other people's joy
B001	Like to watch children open presents
B076	Find it hard to stay in a bad mood if the people around me are happy
B071	Get caught up in the excitement when others are celebrating
B016	Usually end up laughing if the people around me are laughing
B072	Am strongly influenced by the good moods of others
B011	Am unaffected by other people's happiness
B002	Dislike being around happy people when I'm feeling sad
B013	Rarely get caught up in the excitement
B042	Dislike children's birthday parties

Responsive Distress

IPIP #	Item
X253	Am deeply moved by others' misfortunes
H992	Am easily moved to tears
H988	Suffer from others' sorrows
B135	Am upset by the misfortunes of strangers
B046	Would be upset if I saw an injured animal
E64	Am calm even in tense situations
H1046	Am not easily disturbed by events
B067	Am unaffected by the suffering of others
B056	Rarely cry during sad movies
B128	Remain calm during emergencies

Empathic Concern

Item #	Item
H1100	Am concerned about others
E115	Feel sympathy for those who are worse off than myself
X259	Sympathize with the homeless
X219	Believe that criminals should receive help rather than punishment
B024	Believe the poor deserve our sympathy
X244	Feel little concern for others
E169	Have no sympathy for criminals
H435	Look down on any weakness
X103	Don't like to get involved in other people's problems
B051	Have little sympathy for the unemployed

APPENDIX C

Intelligence Tests

Intelligence Tests

Source	Measure	Original Number of Items	Original Working Time Limit	My No. of Items	My Time Limit	My Items
Verbal Closure						
Barchard[1]	Rearranged Words			15	3 min	
French Kit[2]	Hidden Words	20	4 min	15	4 min	Part I lines 1 – 15
French Kit	Incomplete Words	18	3 min	18	3 min	Part I all
Verbal Comprehension						
French Kit	Advanced Vocabulary Test I	18	4 min	12	3 min	Part I items 1, 3, 5, 7, 9, 11, 13-18
Thurstone[3]	Inventive Opposites	30	6 min	15	3 min	even numbered items
Thurstone	Reading I	24	8 min	12	4 min	Items 7, 9, 11, 13, 15, 17,19-24
Inductive Reasoning						
French Kit	Letter Sets	15	7 min	10	4 min	Part I items 1, 3, 5, 7, 9, 10, 11, 12, 13, 14
French Kit	Figure Classification	14	8	8	4 min	Part I items 1, 3, 5, 7, 9, 11, 13, 14
Thurstone	Number Series	22	10	10	4 min	Even Items
Visualization						
French Kit	Form Board	24	8 min	12	4 min	Part I, 2nd and 4th shapes, items 7-12 and 19-24
French Kit	Paper Folding	10	3 min	10	3 min	Part I all
French Kit	Surface Development	5 items in each of 6 drawings	6 min	5 items in each of 4 drawings	4 min	Part I Drawings 1, 3, 5, 6

1. This measure is a new measure, created by Kim Barchard. This measure was modeled after a test called Scrambled Words, by Ekstrom, French, and Harman (1976).
2. Ekstrom, French, and Harman (1976).
3. Thurstone (1934).

APPENDIX D

Other Measures Being Used

Other Measures Being Used

IPIP Measures of the Big Five

The International Personality Item Pool (IPIP; Goldberg, 1999b) is a set of 1,412 items that are publicly available on the Internet. Each item is rated on a five-point scale, based on how well the phrase describes the respondent as they generally are now: a rating of 1 indicates the phrase is "Very Inaccurate", and a rating of 5 indicates that the phrase is "Very Accurate". These items cover a broad range of personality characteristics, and have been used to create public-domain versions of NEO-PI-R, 16PF, and CPI. Goldberg (1999a, 1999b, in press) has also developed both 10-item and 20-item measures of each of the 5 dimensions measured by the NEO-PI-R. In addition, he has developed measures of 30 constructs that are similar to the 30 facets of the NEO-PI-R (Costa et al., 1992). Each of these scales consists of 10 self-report items, approximately half of which are reverse-keyed. Undergraduate students form the upper-level psychology class completed 8-item versions of 23 of these scales. See Table D1. I selected these 23 constructs based on their apparent relevance to the concept of Emotional Intelligence.

Paulhus Deception Scales: The Balanced Inventory of Desirable Responding-7 (PDS: BIDR-7)

The PDS: BIDR-7 (Paulhus, 1999) is a 40-item self-report questionnaire, with two 20-item subscales. The Impression Management (IM) subscale measures the tendency to give inflated self-descriptions to an audience, while the Self-Deceptive Enhancement (SDE) subscale measures the tendency to give honest but inflated self-descriptions, and is closely related to narcissism. Coefficient Alpha for the IM subscale is given as .81 for college students and .84 for the general population. For the SDE subscale, coefficient alpha is given as .70 for college students and .75 for the general population.

Table D1
The IPIP Measures of the 30 NEO Constructs

Facet	Example Item	Coefficient Alpha	I Used
N1: Anxiety	Worry about things.	.83	✔
N2: Anger	Get angry easily.	.88	✔
N3: Depression	Often feel blue.	.88	✔
N4: Self-consciousness	Am easily intimidated.	.80	
N5: Immoderation	Often eat too much.	.77	✔
N6: Vulnerability	Panic easily.	.82	✔
E1: Friendliness	Make friends easily.	.87	✔
E2: Gregariousness	Love large parties.	.79	✔
E3: Assertiveness	Take control of things.	.84	✔
E4: Activity level	Am always busy.	.71	
E5: Excitement-seeking	Love excitement.	.78	
E6: Cheerfulness	Love life.	.81	✔
O1: Imagination	Love to daydream.	.83	✔
O2: Artistic interest	Believe in the importance of art.	.84	✔
O3: Emotionality	Experience my emotions intensely.	.81	✔
O4: Adventurousness	Prefer variety to routine.	.77	✔
O5: Intellect	Enjoy thinking about things.	.86	✔
O6: Liberalism	Believe that there is no absolute right or wrong.	.86	
A1: Trust	Trust others.	.82	
A2: Morality	Stick to the rules.	.75	✔
A3: Altruism	Love to help others.	.77	✔
A4: Cooperation	Can't stand confrontations.	.73	✔
A5: Modesty	Dislike being the center of attention.	.77	
A6: Sympathy	Sympathize with the homeless.	.75	✔
C1: Self-efficacy	Excel in what I do.	.78	✔
C2: Orderliness	Like order.	.82	
C3: Dutifulness	Keep my promises.	.71	✔
C4: Achievement-striving	Work hard.	.78	✔
C5: Self-discipline	Get chores done right away.	.85	✔
C6: Cautiousness	Choose my words with care.	.76	✔

APPENDIX E

Introduction to Factor Analysis

Introduction to Factor Analysis

Factor Analysis is a technique that is used to determine how many dimensions are needed to summarize a set of variables, and what those dimensions are. For example, we might measure Extraversion with 10 different items, but if all the items measure the same underlying dimension, then we can summarize the scores using the total score.

When a factor analysis has been done, the end result is a set of underlying factors. Scores of each participant on each factor can be calculated or estimated, so that these factors can be correlated with other variables of interest. A number of statistics are calculated to assist in interpretation of these factors. One of these is a matrix that gives the correlations between each factor and each of the original variables. This is called the Structure Matrix. The regression coefficients for obtaining the original variables from the factors are also calculated and are given in the Pattern Matrix. These numbers are called primary-factor pattern coefficients, or sometimes loadings. In interpreting factors, we usually focus on the Pattern Matrix. As well, the correlations among the factors themselves can be calculated. This matrix of correlations is called Phi. Finally, the variance of the resulting factors can be calculated. Factors that have a variance of more than 1 account for more variance than one of the original variables (each of which has a variance of 1 when standardized).

When conducting a factor analysis, the first decision is which type of factor analysis to use. There are many different ways of extracting factors from a correlation matrix. These include principal component analysis, common-factor analysis, and image analysis. If a researcher is interesting solely in summarizing observed scores, principal components is a good choice because the first principal component has the maximum reliability of any linear combination of the original variables. However, if the researcher wishes to examine the concepts underlying the observed scores, either common-factors or image analysis is more appropriate. Common-factor analysis examines the variance common to the entire domain, while Image Analysis examines the variance that is common to the particular variables included in the analysis.

The second step in a factor analysis is to determine the number of factors. Three criteria are commonly used. The first of these is called the Kaiser-Guttman rule (Kaiser, 1960). Each factor has a number associated with it, called its eigenvalue. This eigenvalue represents the variance of scores on this factor. A factor with an eigenvalue greater than 1 can account for at least as much variance as a single individual variable. The Kaiser-Guttman rule is that the number of factors is equal to the number of eigenvalues greater than 1.

The second criterion is the scree test (Cattell, 1966). A line graph (called a Scree Plot) is made, which shows the relationship between the number of the factor and its eigenvalue. The first factor will always have the largest eigenvalue (because it accounts for the greatest amount of variance); the second will have the second largest eigenvalue, etc. Therefore, the line graph will be monotonically decreasing. This graph can be examined to determine how many factors exist.

The third criterion is the Maximum-Likelihood Significance Test (Lawley, 1940, 1942). A significance test is used to determine if some specified number of factors can account for the correlations among the original variables. First, the computer attempts to reproduce the original correlation matrix with just one factor and tests the hypothesis that the original and the reproduced correlation matrices are the same. This is then repeated for increasing numbers of factors, until a solution is found where the maximum-likelihood test is

non-significant. When a solution is found where there is no significant difference between the original correlation matrix and the reproduced matrix, we conclude that this is the number of factors needed to account for the original correlations.

Thus, three criteria—the number of eigenvalues greater than 1, the scree plot, and the maximum-likelihood significance tests—are usually used to determine the number of factors. When these three criteria conflict, the interpretability of the factor solutions may also be used to determine the number of factors. I will discuss this in more detail below.

The third step in a factor analysis is to rotate or transform the factors. Let me explain what I mean by transformation. When the factors are first extracted, we might know, for example, that two factors are needed to account for the correlations among a set of variables. These two factors define a two-dimensional space, and each person's scores could be plotted in the two-dimensional space. However, the initial factor analysis does not tell us where we should draw the axes for that two dimensional space. The axes could be drawn in an infinite number of different ways. Some methods of drawing these axes, however, will be better than others. For example, imagine that the factor scores formed an ellipse. It may be convenient if one of our axes went through the longest part of the ellipse (the major axis).

If we transform the axes so that they are still orthogonal to each other, this is referred to as a rotation; if the transformation results in non-orthogonal (or oblique) factors, it is referred to as a transformation. In general, we attempt to transform the factors so that the axes themselves represent meaningful and interpretable dimensions in the data. To do this, we try to find factors that are very different from each other, where each factor is closely associated with some of the original variables and not at all associated with the remaining variables. In the Pattern Matrix, this means that for each factor, some pattern coefficients are large, while the remaining coefficients are close to zero, and each variable has a large loading on only one factor. This pattern of results is called Simple Structure.

In this dissertation, the Harris-Kaiser transformation method will be used (Harris & Kaiser, 1964). This is a family of oblique transformations. The degree of obliquity is controlled by a parameter, c, which usually varies between 0 and 1. In this dissertation, three values of c were used: 0, .25, and .50, and then the best of these transformations was selected. The Harris-Kaiser transformation method usually results in nearly-ideal solutions, and has the advantage that this technique prevents factor collapse. Factor collapse occurs when two factors are very highly correlated, after being transformed. This problem is common with some other oblique transformation methods, but is completely avoided by the Harris-Kaiser transformation method.

When trying to find a good transformation, a number of different transformations are attempted, and the Pattern Matrices associated with each of these transformations are examined to determine which comes closest to Simple Structure. Four criteria are usually used in evaluating how close a particular transformation is to achieving Simple Structure. The first is the number of "salient" pattern coefficients. A loading is considered salient or important if it is larger in magnitude than some prespecified value. For a principal components analysis, coefficients might be considered salient if they are larger than .30 or .40; for common-factor analysis, we might use .25 or .30 as the criterion; for image analysis, we might use .20 or .25. Salient coefficients are important because they define what a factor is measuring. Ideally, each variable will have at least one salient coefficient.

The second criterion is the number of complex variables. A variable is complex if it has salient pattern coefficients for more than one factor. Complex variables are bad because they make it difficult to distinguish between factors.

The third criterion is the hyperplane count. A loading is considered to be on the hyperplane if it is close to zero. Hyperplane coefficients are important because they are used to define what the factor is *not* measuring. Different criteria are used to determine if a loading falls on the hyperplane. Criteria of less than .05 or .10 are commonly used.

The fourth criterion is the correlations among the factors. For a given number of complex variables and a given hyperplane count, it is better if one's factors have lower intercorrelations. Lower intercorrelations are good because this means that the factors are measuring distinct concepts.

Once a factor solution has been rotated, we can examine the Pattern Matrix to determine what each factor is measuring (the salient coefficients) and what each factor is not measuring (the hyperplane coefficients), and thus arrive at an interpretation of the factors. If no coherent interpretation of a factor is possible, this may indicate that too many factors have been extracted, and the factor analysis should be re-done with fewer factors.

Factors with only a single salient loading are called singletons. Singletons are rarely of interest because they are related to only one of the original variables and thus do not represent something that different variables have in common. Factors with only two salient pattern coefficients are called doublets. Doublets may be of interest, because they represent something that at least two variables have in common, but doublets are often hard to replicate from one study to the next. The presence of singletons or doublets may indicate that too many factors have been extracted.

In general, factor analysis is a large sample technique. Participant to variable ratios of 5:1 are considered acceptable, although 10:1 is preferable. Sample sizes of 200 or more are usually sufficient.