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The Effects of Emotional Intelligence on Performance of a

Cognitive Task in the Context of Collaboration vs. Competition

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ABSTRACT

Emotional intelligence (EI) is a controversial construct, which affords a range of emotion-related skills including emotion perception; emotional facilitation of thinking; emotional understanding; and emotion management (Mayer & Salovey, 1997). Notably, EI can be considered as (1) a trait akin to personality (e.g., Petrides & Furnham, 2001), in which case it is measured using self-report questionnaires of socioemotional functioning; or (2) an ability, in which case it is measured using maximal performance tests (e.g., Mayer, Salovey, & Caruso, 2002).

Teamwork has been a subject of investigation under military sponsorship since the 1950s (Paris, Salas, & Cannon-Bowers, 2000). Since that time teamwork research has evolved from a narrow social psychological focus to a broader domain, including organizational settings (Levine & Moreland, 1990). There, the use of teams has been increasing since the 1980s, and teamwork has been investigated as a way to enhance performance, especially in settings where task complexity has greatly increased.

EI may affect the ability of workers to relate with fellow team members more agreeably, adapt to teamwork more effectively, thus improving team performance and productivity (Goleman, 1998). Moreover, it may affect workers' performance differentially based on instructions they receive regarding collaborating or competing with team members.

The aim of the current study was to test the effect of EI on performance of a cognitive task in the context of collaboration toward a prestigious team goal vs. competition for a prestigious job promotion. 311 participants, in pairs and singly, decided whether a series of animated characters were "correct" or "incorrect," in a discrimination-learning paradigm. Three conditions (i.e., two teamwork conditions: collaboration, competition; and a control condition)

were manipulated, and the number of errors was recorded over 100 trials. EI, personality, teamwork attitude and general intelligence were assessed pre-task. Subjective state was assessed pre-and post-task. Teamwork experience and impression of the participation partner's personality (of collaborators and competitors only) were measured post-task.

Results showed a significant effect for learning across trials, and faster learning in the team conditions. EI, personality, teamwork attitude, and general intelligence failed to predict performance; however, EI predicted subjective state which in turn predicted learning. EI also predicted teamwork attitude and subjective experience of teamwork. Knowledge of this association can be useful for pairing team members for longer-term projects, when they will have the opportunity to get to know one another better over time. Based on previous results (e.g., Jordan & Troth, 2004; Offermann, Bailey, Vasilopoulos, Seal, & Sass, 2004) it may be desirable to select team members with high EI in order to enhance teamwork. Additionally, personnel and team support mechanisms should focus on how subjective states might influence team member relationships and attention to the task at hand.

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CHAPTER 1

INTRODUCTION

The background for this dissertation draws from two bodies of research that hold important practical implications for industrial and organizational psychology: emotional intelligence (EI) and teamwork. I begin this dissertation with a survey of EI, including its coverage in the popular press and common popular applications. I will then present the scientific perspective of EI, including its theoretical basis and implications; and a four-branch hierarchy developed by Mayer and Salovey (1997) along with a description of the abilities implied therein. Next, I will discuss EI assessment methods, focusing on self-report questionnaires and two new situational judgment measures. I will also present a critical view of EI which argues for objective assessment of the construct. Then, I will introduce empirical evidence of the utility of EI to identify individuals who might work more effectively in high-stress jobs.

Next, I will present a review of the teamwork literature, beginning with a short history of teamwork research, and including a discussion of the theory guiding it over the years and in different fields of interest. I will give special attention to the subject of teamwork in organizational settings. I will then discuss a body of research involving the intersection of teamwork and EI. This will entail findings from organizational settings as well as a discussion of the common limitation of studies in these domains, namely the failure to control for cognitive ability and personality.

EMOTIONAL INTELLIGENCE

Emotional intelligence is a controversial construct around which much debate has revolved since Salovey and Mayer (1990) introduced it into the scientific literature. Drawing upon research into emotion, as well as that of intelligence, EI was conceived as an ability to

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successfully understand and manage one's own as well as others' emotions. According to this conception, heeding emotions could facilitate adaptive behavior and lead to intelligent situational and life decisions. However, although various EI researchers have developed a number of different EI scales, its ability to predict human performance remains in question. This dissertation chronicles another stage in my attempt to provide such validation (cf. Fellner, 2006), by investigating whether EI facilitates the ability to use emotional cues in discriminating "correct" and "incorrect" animated characters in the context of collaboration vs. competition in a work environment.

Popular View of Emotional Intelligence

Emotional intelligence (EI) gained widespread popularity with the general public through Daniel Goleman's (1995) book, *Emotional Intelligence: Why It Can Matter More than IQ*. According to Goleman EI can enhance self-control, increase persistence, and amplify self-motivation. Additionally, it can help in controlling emotional impulses, discerning the hidden feelings of others, and ensuring smooth personal relationships. Furthermore, he asserts that these skills can improve interpersonal interactions and outcomes in a variety of different life situations. With respect to marital relationships, Goleman asserts that women's greater emotional competence stems from the divergent upbringing experienced by girls and boys. While girls are encouraged throughout childhood and adolescence to experience and learn about emotions, boys are not. Consequently, young women become much more emotionally astute than young men as they enter adulthood.

Goleman (1995) also claims important implications for EI in the workplace, particularly in light of increased globalization occurring in many industries. He states that companies can improve their bottom line profitability by fostering emotionally intelligent work practices.

Specifically, he believes that high-EI work teams can improve expertise and performance through increased collaboration both internally and externally. Moreover, high-EI managers can use their emotional knowledge to motivate their employees more effectively, and enhance the quality of their decision-making.

Goleman (1995) also advocates for EI in the delivery and administration of medical care. Managed health care, he argues, promotes an environment in which the emotional health of patients who are seriously physically ill might be neglected or ignored. An emotionally intelligent care regimen might involve helping patients to manage their emotional reactions to their situation; actively attending to and candidly answering questions about their condition; and training them in relaxation techniques, which could help moderate negative emotions. Goleman believes that procedures such as these can promote faster healing. Indeed, he asserts that some hospitals have reported releasing patients up to three days earlier than projected when they received such emotionally intelligent health care. This can lead to substantially reduced health care costs.

Success in the foregoing situations is highly desirable and would admittedly be more likely if the concerned individuals possessed the self-control, self-motivation and personal relationship abilities that Goleman has repeatedly (1995, 1998) attributed to EI. Other authors in the popular self-help media (cf. Cooper & Sawaf, 1997; Gibbs, 1995) also inferred the value of these abilities for accomplishing personal and social goals and followed with their own contributions to the popular literature on business and personal development. However, as influential as these works have been, the conclusions and suggestions for practice were not based upon empirical findings, which is a necessary condition if they are to be accepted by the

scientific community. I will now discuss EI from a scientific viewpoint and discuss a series of studies representative of research in that area.

Scientific Perspective of Emotional Intelligence

Emotional intelligence was introduced into the scientific literature by Salovey and Mayer in 1990 (see also Mayer, DiPaolo & Salovey, 1990). These researchers assert that the concept of EI as a discrete construct arose from research on both emotion and intelligence and point out that there is disagreement among emotion theorists and researchers as to whether emotions are facilitative or disruptive. Some view them as a means of adaptation, which enables individuals to focus their mental activity toward a desired end. Others believe that emotions disrupt functional thought processes and should therefore be suppressed. Salovey and Mayer believe that emotions constitute an "organized, multi-system, psychological response" (Fellner, 2006, p. 4) based on an individual's positive or negative assessment of some internal or external event. They assert that emotions are akin to moods, though stronger but shorter, and that they can greatly improve intra- and interpersonal relations.

With respect to intelligence, Salovey and Mayer (1990) point out that it has been treated differently by various researchers. However, the definition of intelligence cited most frequently, "the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment" (Wechsler, 1944, p. 3), incorporates E. L. Thorndike's (1920) idea of verbal, visuospatial and social intelligences; Gardner's (1983) theory of multiple intelligences; and Sternberg, Conway, Ketron, and Bernstein's (1981) concept of academic as opposed to everyday intelligence. Salovey and Mayer also discuss the importance of acknowledging the *models of intelligence* paradigm, in which discrete categories of mental abilities may relate very loosely with each other within an individual. For instance, an individual

may have exceptional verbal skills, minimal visuospatial aptitude, and mediocre social competence. Notably, this paradigm is consistent with theoretical definitions of intelligence developed by scholars such as Wechsler.

In 1997, prompted by the artistic license various researchers (cf. Emmons & Colby, 1995) and popular authors (Gibbs, 1995; Goleman, 1995, 1998) had taken with the concept of EI, Mayer and Salovey (1997) published an updated conceptualization of EI in which they clarify and refine its definition. First, they deconstruct the term into its constituents, *emotion* and *intelligence*, which they place under the overarching construct of *mind*, which itself is divided into three parts: *cognition, affect, and motivation*. They place emotion in the sphere of *affect* and intelligence in that of *cognition* but stress that emotional intelligence does not automatically follow from an association between affect and cognition. For instance, Mayer, Gaschke, Braverman, and Evans (1992) pointed out that mood congruent behavior might help or hamper an emotional situation. EI is present when individuals use emotions to guide their actions toward successful conclusions. For example, while aggressive behavior is usually inadvisable and unproductive, it may at times be necessary in order to produce a desired effect.

Mayer and Salovey (1997) argue that EI research should investigate these affective and cognitive abilities rather than focusing solely on motivational abilities (cf. Goleman, 1995). This view led to their streamlined definition of EI as, "the ability to perceive accurately, and express emotion, the ability to access and/or generate feelings when they facilitate thought, the ability to understand emotion and emotional knowledge, and the ability to regulate emotions to promote emotional and intellectual growth" (p. 10). This updated definition stresses the interaction of intelligent thinking and the use of emotions, thereby creating an amalgam of the two.

Criteria required for validating EI as a new, discrete type of intelligence are multi-faceted and stipulate that EI be compared to each of its constituents. With respect to intelligence, Mayer and Salovey (1997) argue that EI measures should correlate modestly with other recognized intelligences, thereby yielding incremental information regarding an individual's levels of those other constructs. Very high or low correlations would be problematic for validation of EI; high correlations would call into question its claim as a discrete intelligence, while low correlations would imply that EI does not qualify as an intelligence.

Validation criteria also dictate that EI should be differentiated from traits and talents. Mayer and Salovey (1997) posit that beyond conventional traits such as compassion, affability and reliability, that define a person's usual demeanor, skills such as discerning another individual's feelings might exist. Those abilities might involve considerable mental deliberation, and thus be regarded as a type of intelligence that could be labeled "emotional intelligence."

Validation of EI also requires that, in addition to comparing it to intellectual and nonintellectual skills and abilities, EI be evaluated with respect to research on emotion (Mayer & Salovey, 1997). They point out that extreme emotions do not always hinder rational thought, and that emotional disturbances, be they positive or negative, can serve as catalysts for focusing attention on potentially meaningful information about one's own and others' relationships with the world. This would aid in promoting rather than preventing rational thought. Indeed, generalizing this emotional reasoning ability to the domain of personal relationships, Mayer and Salovey assert that emotional principles can be used to negotiate feelings. For instance, complimenting a colleague could stimulate a range of reactions, from grateful complaisance to skeptical smugness, depending upon the attitude of the recipient. The ability to discriminate these two responses represents some sort of intelligence.

According to this conceptualization of EI, it can be expected that some events are universally accepted as positively or negatively-valenced and that certain emotional reactions to them can be objectively deemed appropriate. Conversely, there are situations in which it is necessary to consider personal characteristics and history; group norms and practices; and cultural background and traditions so as to recognize appropriate emotional responses to events. For instance, Mayer and Salovey (1997) argue that when two people shout at each other it does not necessarily mean they dislike one another. In fact, they might be close friends, who are frustrated, either with each other or with the situation in which they find themselves. In fact, when an individual possesses a holistic understanding of the social and cultural environment, it is possible to logically assess a wide variety of emotional responses. This individual can be labeled emotionally intelligent.

The Four Branches of Emotional Intelligence

In revising their conceptualization of EI, which added the element of thinking about feelings, Mayer and Salovey (1997) organized the construct into a four-branch hierarchy of skill levels, which ranged from simple to complex, and also progressed through more sophisticated levels of EI proficiency. The first branch, upon which the rest of the hierarchy is based, refers to perceiving, appraising and expressing emotion. Early in life, normally-developing children can recognize emotions in their bodily states, feelings and thoughts. As they continue to develop, they begin to recognize emotions in other individuals and also various objects by appraising behavior, sounds and language. Soon, they learn to accurately express emotions and convey their needs. Finally, they learn to differentiate honest and accurate expressions of emotion from dishonest and false ones.

The second branch of the EI hierarchy concerns emotional facilitation of thinking (Mayer & Salovey, 1997). At an early developmental level, this branch begins with using emotions to prioritize thoughts based on important situational information. As development progresses, emotions that will help in decision making can be purposefully produced in order to yield more effective decisions. Soon, it becomes apparent that manipulation of moods can help in considering various perspectives, and that engaging in an intentional mood change can facilitate a variety of modes of reasoning.

The third branch of the EI hierarchy involves analyzing and understanding emotions, and using emotional knowledge (Mayer & Salovey, 1997). The early stage of this branch affords the ability to label and classify emotions, and thus the awareness of degrees of intensity of emotions such as liking, disliking and ambivalence. This capacity progresses to an ability to realize how various circumstances and associations produce varying degrees of emotions, followed by the ability to comprehend complex or conflicted emotions, and also blended emotions like awe. Finally on this branch, skill in evaluating the progressions of emotion becomes manifest.

The fourth branch of the EI hierarchy entails conscious regulation of emotions with the goal of improving emotional and intellectual success. This aspect of EI involves opening up to emotions, whether pleasurable or objectionable, as an antecedent to separating feelings from actions when they might bring about detrimental outcomes. As development progresses on this branch, individuals begin to think about their emotions and moods, as opposed to merely experiencing them. This meta-experience is comprised of two elements. Meta-evaluation is to attend to one's mood and ensure its situational appropriateness. Meta-regulation is to curtail one's negative emotions while cultivating the positive ones, and also maintaining the integrity of the information they convey.

This hierarchy of EI implies a collection of emotional skills, proficiency at which Mayer & Salovey (1997) assert might equate to emotional achievement and emotional competence in the same manner as academic intelligence equates to academic achievement and academic competence. Mayer and Salovey advocate for development of the concept of EI and its underlying abilities because therein lie the adaptable tools with which to evaluate emotions. In the next section I will present information about several EI evaluation strategies. This will include a description of different models of EI and their approaches to measurement.

Measurement of Emotional Intelligence

Reliable and valid measurement of emotional intelligence is essential if the construct is to be accepted as a unitary psychological construct. According to Mayer & Salovey (1997), EI comprises a number of personal attributes whose measurement presents a challenge. Furthermore, the interest in EI among the general public as well as the scientific community has given rise to many conceptualizations of EI; however, they generally fall under one of three different models of EI. I will now present these three models and also discuss a measure of EI that is representative of those used under each model.

Models for assessment

There are many approaches to EI assessment, and the selection of measurement instruments used by any particular researcher depends principally on the model of EI under which his or her approach falls. Mayer, Salovey, and Caruso (2000b) identify two opposing models of EI, *mental ability models* and *mixed models*, while Petrides and Furnham (2001) introduce a third, *trait EI*. Those who believe that EI is a cognitive ability involving mental processing of affective information hold that maximal performance tests should be used to measure EI (cf. Mayer & Salovey, 1997). Those who view EI as a facet of personality argue that

questionnaires reporting typical social-emotional functioning can be used (cf. Bar-On, 1997; Petrides & Furnham, 2001; Schutte et al., 1998). Proponents of mixed models (cf. Mayer et al., 2000b) concede that certain personal characteristics complement the cognitive abilities comprising EI and grant that self-report questionnaires can be used to measure it.

Mental ability models.

According to this paradigm, EI is a discrete intelligence, which focuses on the manner in which emotions and cognitions interact (cf. Mayer & Salovey, 1997; Salovey & Mayer, 1990), and how individuals manage the circumstances of their lives more effectively (Mayer et al., 2000b). Assessment tools under this model should satisfy three empirical criteria: (a) mental problems should have objectively-defined correct and incorrect answers, and scores should converge with those on other like instruments; (b) the abilities measured by the instrument should correlate with other cognitive abilities, as well as self-reported empathy; and (c) absolute levels of ability should increase with age. Typical skills assessed under mental ability models of EI entail the ability to perceive and express emotions, use emotions to facilitate thought, and regulate emotions.

The four-branch model of EI developed by Mayer and Salovey (1997) led to development of two performance-based measures of EI: the Multifactor Emotional Intelligence Scale (MEIS; Mayer, Caruso, & Salovey, 1999), and the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002). Each of these instruments is comprised of four sections corresponding to the four branches of EI: (1) perception of emotion, (2) use of emotion in facilitating thought, (3) comprehension of emotions, and (4) management of emotions. As expected, these instruments contain items whose answers are objectively-

defined as correct or incorrect and thus constitute a valid means to confirm or deny the existence of a specific skill.

The MEIS consists of 12 subscales, and uses a combination of scoring methods: consensual, expert, and target scoring. Consensual scoring evaluates an individual's answer on a specific item based on the proportion of the group of individuals completing the instrument who answered that item in the same manner. For example, if .85 of the group responded that anger was "definitely absent" in an item, individuals who gave this response would receive .85 for that item. Expert scoring entails first identifying experts, who complete the test using their expert knowledge regarding the subject to choose the best answer for each item. Then, participant responses to each item are scored "1" if they match, or "0" if they differ from those of the experts. Target scoring consists of obtaining information from the "target" (i.e., the individual whose behavior is being judged) and scoring participant responses "correct" if they match, or "incorrect" if they differ from those of the target. This is not a commonly used scoring method.

In general the MEIS has been evaluated favorably as to reliability, distinctiveness, and relevance to a number of noteworthy life outcomes (Matthews, Zeidner, & Roberts, 2002). However, several limitations have been identified, including lengthy administration time, unsatisfactory levels of reliability on some subscales, and problematic scoring despite the assertion that it is an objective test. In addition the four-branch model, upon which it is based, enjoys only limited empirical support, and it is questionable whether it assesses EI, or simply individual differences in emotionality.

The MSCEIT ([Version 1.1] Mayer, Salovey, & Caruso, 2000a; [Version 2.0] Mayer, Caruso, & Salovey, 2000) was developed to improve on the MEIS. The number of items was decreased on each successive version, but the 12 subscales, which were founded on the four-

branch hierarchy of EI were retained. In addition, a change in the panel used for expert scoring on Version 2.0 was initiated: instead of relying on two of the test authors, a group of 21 members of the International Society of Research on Emotions (ISRE) was used. However, Matthews, Zeidner, et al. (2002), report a decline in mean reliabilities for consensus scoring on the scales from .77 on the MEIS to .71 on the MSCEIT Version 2.0. Finally, the authors did not compare Version 2.0 with Version 1.1, thereby providing evidence of construct validity and confirming that both versions measured the same construct. Overall, the psychometric properties of the MSCEIT are somewhat improved over the MEIS, but some of its limitations remain.

Trait EI

Petrides and Furnham (2001) conceive EI to be a trait as opposed to an ability. Thus, it is most suitably studied under the auspices of personality research because it is comprised of a collection of traits, self-perceived skills, and behavioral dispositions, rather than the cognitive-emotional abilities described by mental ability models of EI. Accordingly, their proposed sampling domain includes qualities such as assertiveness, trait optimism, and relationship skills. Typical measures of trait EI are self-report questionnaires, two of which I describe next.

TEIQue. The Trait Emotional Intelligence Questionnaire (TEIQue; Petrides, Pérez, & Furnham, 2003) is a 144-item instrument containing the following 15 subscales: Adaptability, Assertiveness, Emotion Expression, Emotion Management (others), Emotion Perception, Emotion Regulation, Empathy, Happiness, Impulsiveness (low), Optimism, Relationship Skills, Self-Esteem, Self-Motivation, Social Competence, and Stress Management. According to Petrides and Furnham (2003), the items contained in this questionnaire represent comprehensive coverage of the EI sampling domain because they encompass the aspects of EI distinguished by various EI theorists (cf. Bar-On, 1997; Goleman, 1995; Salovey & Mayer, 1990). Petrides and

Furnham (2003) base a claim for construct validity on two studies. First, they demonstrated that high trait EI was associated with increased ability to identify six universally recognized facial emotions (happiness, sadness, anger, fear, surprise, and disgust; Ekman & Friesen, 1975). In another study, high trait EI was associated with increased sensitivity to mood induction, as assessed using the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1992), even after controlling for Big Five personality traits (NEO PI-R; Costa & McCrae, 1992b).

TMMS. The Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995) is a 30-item measure for identifying individual differences in traits that may be innate in individuals who can recognize their own feelings and convey them to others (i.e., who are emotionally intelligent). The TMMS is comprised of three subscales: Attention to Feelings, which measures how aware individuals are of their emotions; Clarity of Feelings, which measures the clarity with which they experience feelings; and Mood Repair, which measures their beliefs regarding their ability to extend positive moods or curtail negative ones.

Salovey et al. (1995) report that the TMMS demonstrates convergent and discriminant validity with respect to other mood and mood regulation measures. They studied 86 undergraduates and found that Attention to Feelings related to public and private self-consciousness as measured by Fenigstein, Scheier, and Buss's (1975) Self-Consciousness Scale (SCS). In addition, Clarity of Feelings was negatively associated with dissatisfaction with the ability to express emotion as assessed with the Ambivalence Over Emotional Expressiveness Questionnaire (AEQ; King & Emmons, 1990). Negative correlations were also found between Clarity and two subscales on the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977): ambivalence regarding the quality and magnitude of emotions they reveal to others, and depression. Finally, Mood Repair revealed a negative association with the CES-D;

and positive associations with optimism as measured by the Life Orientation Test (LOT; Scheier & Carver, 1985); and beliefs regarding the ability to regulate negative moods as measured by the Expectancies for Negative Mood Regulation (NMR; Catanzaro & Mearns, 1990).

Ghorbani, Bing, Watson, Davison, and Mack (2002) also conducted a validity study, which involved 220 American university students. Ghorbani et al. view the TMMS from an information processing perspective, framing the three subscales as inputs (attention to emotions) leading to cognitive processing (clarity of emotions) that ultimately generates outputs (repair of emotions). Their predictions were confirmed in that the three subscales related with higher self-esteem as assessed by Rosenberg's (1965) 10-item Guttman scale; and lower levels of depression as assessed by Costello and Comrey's (1967) depression and anxiety scales. In addition, expected negative correlations with all three factors of the Toronto Alexithymia Scale (TAS; Taylor, Ryan, & Bagby, 1985; EOT: Externally Oriented Thinking, DIF: Difficulty Identifying Feelings, DDF: Difficulty Describing Feelings) were confirmed. Finally, the Clarity and Repair subscales related to decreased anxiety on the Costello and Comrey measure; and lower perceived stress on the Cohen, Kamarck, and Mermelstein (1983) Perceived Stress Scale (PSS). These relationships coincide with those described by Salovey et al. (1995).

Mixed models

Mixed models of EI consider the construct from a broader point of view than the mental ability and trait models (Mayer, Salovey, et al., 2000b). In addition to cognitive abilities such as perceiving and expressing emotion they also comprise non-cognitive attributes, such as personality traits, which theoretically promote successful life outcomes. These include self motivation and self regard, as well as impulse control and managing personal relationships (cf.

Bar-On, 1997; Goleman, 1995). The Emotional Quotient Inventory (EQ-*i*; Bar-On, 1997)

exemplifies the type of instrument used under this model of EI.

EQ-i. The Emotional Quotient Inventory (Bar-On, 1997) is a 133-item self-report

questionnaire consisting of five composite scales, which in turn comprise 15 subscales. The five

composite scales include (1) intrapersonal EQ, which comprises assertiveness, emotional self-

awareness, independence, self-actualization, and self-regard; (2) interpersonal EQ, which

comprises empathy, relationship skills, and social responsibility; (3) adaptability, which

comprises flexibility, problem solving, and reality testing; (4) stress management, which

comprises impulse control and stress tolerance; and (5) general mood, which comprises

happiness and optimism.

Dawda and Hart (2000) conducted a study to investigate the reliability and validity of the

EQ-*i* using a student sample of 243 (125 female, 118 male) participants. There were no gender

differences overall, but they found disparate results on the social responsibility subscale (women

scored higher) and the optimism and independence subscales (men scored higher). Internal

consistency likewise, was high though the second-order factors showed differential ranges of

reliability coefficients with women's being more variable.

Dawda and Hart (2000) also conducted a test of construct validity on the EQ-*i* composite

scales. They report associations in the expected directions with personality as measured by the

NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1991), depression as measured by the

Beck Depression Inventory (BDI; Beck & Steer, 1987), alexithymia as measured by the Toronto

Alexithymia Scale (TAS-20; Bagby, Taylor & Parker, 1994), and somatic symptomatology as

measured by the Somatization scale of the Revised Symptom Checklist-90 (SCL-90-R;

Derogatis, 1983), thus indicating good convergent and discriminant validity.

In sum, the results described suggest that a definitive measurement method for EI has not yet been achieved. It seems clear from the foregoing findings that alternative methods of measuring EI should be explored so that EI can finally be accepted as a unitary construct. In the next section I introduce a methodology that might fulfill that requirement, and then discuss two new EI measures that use this methodology.

Situational Judgment Tests

Situational judgment tests (SJTs) are assessment instruments used widely in industrial and organizational settings (Weekley & Jones, 1999). While SJTs were originally conceived to measure actual behavior in various situations, present-day SJTs typically consist of paper-and-pencil instruments that present respondents with situations related to some ability or quality that is being investigated. For instance, employment applicants might complete a SJT which contains of a number of situations that will be encountered in the job for which they are applying. In recent years SJTs have been developed for managerial judgment (Motowidlo, Dunnette, & Carter, 1990), supervisory judgment in the armed services (Borman, Hanson, Oppler, Pulakos, & White, 1993), and tacit knowledge (Wagner & Sternberg, 1991).

As assessment instruments used in work settings, SJTs are used to predict job performance, though it is not entirely clear as to why they work and what they measure (Weekley & Jones, 1999). One perspective holds that they capture the individual's domain-specific tacit knowledge (i.e., their ability to generate effective solutions to real world challenges by virtue of previously-acquired experience, but without necessarily relying on cognitive ability (Sternberg, Wagner, Williams, & Horvath, 1995). Another view suggests that SJTs mediate the relationships between an individual's inherent cognitive ability and his or her job-related experience (Chan & Schmitt, 1997). Alternatively, Schmidt and Hunter (1993) believe that SJTs

simply measure job knowledge, which in turn relates consistently with cognitive ability, experience, and performance. Weekley and Jones suggest that recent interest in SJTs may reflect a desire to develop an alternative to conventional cognitive ability tests.

Development of Situational Judgment Test Items

According to McDaniel and Nguyen (2001), development of a SJT for a particular job begins by obtaining a list of critical incidents from subject matter experts (SMEs) or incumbents of that job. These individuals may be asked to relate such incidents through free association, or to address specific situations targeting specific job competencies that were identified through a prior job analysis. Typically, these situations revolve around internal and external customer needs, coworker relations, and company interests. The test developer then reviews the critical incidents and identifies those which can be developed into question stems for situational judgment items. In developing items, similar incidents can be grouped into representative situations, or used individually in order to obtain comprehensive coverage of the content domain. Item stems are then edited for length and complexity with the goal of achieving comparable length and complexity for all items. Close attention must be paid to the tradeoff between situation specificity and generality to all test-takers.

When items are deemed ready, they are presented to a group of respondents who are asked to identify one or more options given for resolving each situation (McDaniel & Nguyen, 2001). These individuals can be either experts or novices and they might be asked to identify the best and worst solution, the best and second best solution, or what they would do versus what the best solution would be. The goal at this stage of development is to obtain a group of options that represents a broad range of efficacy for each situation. Experts can provide insight about what

particular solutions will be effective, while novices will typically generate a broad range of options whose levels of efficacy vary.

Situational Judgment Item Characteristics

As SJT items are being developed, a number of characteristics should be noted for both the items stems and the item responses (McDaniel & Nguyen, 2001). Item stems can be differentiated according to five attributes. First, *fidelity* concerns the degree to which the stem format is veridical with the manner in which the situation will be experienced in the workplace. This refers to whether the item stem is presented in video or written format. Second, stem *length* concerns whether it is short and succinct, or long and convoluted. Third, stem *complexity* refers to whether it portrays a simple situation or a multifaceted scenario. Fourth, stem *comprehensibility* is the degree to which the meaning and consequence can be understood by the respondent. In combination with length and complexity, this can greatly increase the cognitive load of item stems. Finally, stems can be *hierarchical*, consisting of an overarching scenario and one or more subordinate situations, all of which must be considered in identifying a satisfactory solution.

SJT response options are typically presented in written format even for video-based stems (McDaniel & Nguyen, 2001), and can vary depending on the instructions for evaluating response options, as noted above. McDaniel and Nguyen speculate about expected response sets for these different instructions. They believe that the most likely/least likely instructions carry a higher likelihood for faking and would reveal different information about respondents. For honest people, responses should predict their future behavior; for fakers, responses should tap their knowledge. The case is similar for the best response/worst response instructions. While these instructions are more resistant to faking and should lead to higher validity, they are not immune.

Here, for honest people and fakers alike, responses tap their knowledge. Indeed, Freudenthaler and Neubauer (2005) clearly demonstrated that differing instructions can yield much different information. They found that under *would do* instructions test scores correlated more strongly with personality, while under *should do* instructions they correlated more strongly with intelligence. The next step in SJT development is creating a scoring key, which I describe next.

Scoring Methods for Situational Judgment Tests

Situational judgment tests can be scored in a variety of ways (McDaniel & Nguyen, 2001). One way is to ask SMEs or highly skilled employees to develop an answer key based on their superior knowledge of real-world outcomes of the situations. Typically, consensus will be reached among these experts. Another method of scoring is to administer the SJT to a scoring sample, and use central tendency statistics to ascertain the most (and least) effective solutions. A third scoring option is to use an empirical scoring method, as described below.

According to Weekley and Jones (1999), the empirical scoring method entails randomly dividing a large group of respondents into either a validation or cross-validation sample. When these respondents have completed the SJT, criterion means are computed by response option in order to determine the correct "best response" for each item. This is done by identifying the response option that displays the highest mean response rate and, as long as at least 10% of the respondents selected that option, designating it as the correct "best response." Respondents who correctly identify this empirically determined "best response" are awarded +1 point. In a similar manner, the correct "worst response" is designated by identifying the response option associated with the highest mean response rate, as long as at least 10% of the respondents selected that option. Respondents who correctly identify this empirically determined "worst response" are also awarded +1 point. If respondents commit errors by (a) choosing the worst response as the

"correct best response" and/or (b) choosing the best response as the "correct worst response" they will be penalized, receiving -1 point. Their score for each situational item equals the sum of points they earned in this process. Consequently, a respondent's score on each item can range from -2 to +2 depending on how accurately s/he chooses the "best" and "worst" responses.

As mentioned above, there is some controversy regarding what exactly is being measured by SJTs (McDaniel & Nguyen, 2001). Sternberg and Wagner, (1993; also cf. Sternberg et al., 1995) argue that tacit knowledge is being measured whereas others contend that situational judgment itself is the construct of question. McDaniel and Nguyen, however, join other recent authors in the belief that SJTs represent a measurement *method*, which can be incorporated into the study of many different types of constructs. I turn next to a description of two such tests for EI, the Situational Test of Emotional Understanding and the Situational Test of Emotion Management (MacCann & Roberts, 2008).

Situational Test of Emotional Understanding (STEU)

The Situational Test of Emotional Understanding (STEU; MacCann & Roberts, 2008) is a 42-item measure developed to assess emotional understanding as defined by the Mayer, et al. (2000b) four-branch EI hierarchy. It consists of 14 discrete subscales, each of which provides a situation involving a work-life, personal life, and context-free item. The subscales include anger, contempt, dislike, distress, fear, frustration, gratitude, hope, joy, pride, regret, relief, sadness, and surprise. These subscales, and consequently item generation for the STEU, were based on Roseman's (2001) appraisal theory of emotions, which entails the following seven appraisal dimensions. *Situational state* concerns whether a situation is desired (motive-consistent) or undesired (motive-inconsistent). *Motivational state* refers to the desire to maximize reward (appetitive) or minimize punishment (aversive). *Causal agency* involves whether an event is

appraised as having been caused by oneself (self-caused), another individual (other-caused), or is just a matter of circumstance (circumstance-caused). *Expectedness* simply means an event was expected or unexpected, while *certainty* refers to the likelihood that an event will happen (certain vs. uncertain). *Control potential* concerns the degree to which one believes s/he can change the aspects of a situation that are motive-relevant (high vs. low). *Problem type* refers to whether uninvited situations are instrumental (i.e., they are unwanted because they block the achievement of one's goals) or intrinsic (i.e., they are unwanted simply due to the nature of the situation). Each of these dimensions is associated with a positively- and negatively-valenced emotion, which comprise the 14 subscales of the STEU. Since the STEU is theory-driven, a standards-based, objectively-determined dichotomous scoring key was established (MacCann & Roberts, 2008).

MacCann and Roberts (2008) report good reliability, $\alpha = .71$, for the STEU in one study and moderate reliability, $\alpha = .43$, in a second study. It should also be noted that in comparison with the first study, the second study attained $\alpha = .71$. The STEU predicted academic achievement as assessed by the participants' psychology grades at the end of their first university semester, and their end of year grade point average (GPA). In addition, it was associated with vocabulary as measured by Stankov's (2000) 18-item test of crystallized intelligence and verbal comprehension. Other associations included the Big Five personality factor Agreeableness as measured by the Openness Conscientiousness Extraversion Agreeableness Neuroticism Index Condensed 20-item version (OCEANIC-20; Roberts, 2000) and the Stories subscale from the Multifactor Emotional Intelligence Scale (MEIS; Mayer, et al., 1999). They report negative associations with the Externally-Oriented Thinking subscale of the Toronto Alexithymia Scale

(TAS-20; Bagby, Parker, & Taylor, 1994) and Anxiety and Stress as measured by the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995).

Situational Test of Emotion Management (STEM)

The Situational Test of Emotion Management (30-item version; STEM-30; MacCann & Roberts, 2008) is a 30-item instrument whose aim is to measure emotion management as defined by the Mayer et al. (2000b) four-branch EI hierarchy. It contains three subscales: anger (9 items), fear (7 items), and sadness (14 items). Items for these subscales were generated through a series of semi-structured interviews of 50 people (31 women) who related from three to 11 emotional events they had recently experienced. A total of 290 scenarios were recorded, transcribed, analyzed for content, and distilled into 138 test items representing the emotions anger, disgust, fear, and sadness. For each of these emotions, items were constructed such that six or more contained workplace subject matter, and six or more contained personal life subject matter. Response options were generated using another group of 99 individuals (56 women) who were divided into three groups. Members of each group responded to about one-third of the 138 items, and wrote both (a) what they thought one *should do* to resolve the situation, and (b) what *they would do* to resolve the situation if they personally experienced it. This step revealed many items for which there was one very clear resolution, and which were dropped due to their limited variability in responses. This step yielded 44 items (18 for anger, 14 for sadness, and 12 for fear) with four alternative response options. Two scoring keys were developed for a multiple-choice version of the test by asking a group of 13 experts (9 women) to complete the test. In one key, response options were weighted by calculating "the mean expert rating of each option;" in the second key, response options were weighted by "the proportion of experts selecting each

option." This 44-item STEM was later reduced to the 30 items noted above to increase its reliability and validity.

MacCann and Roberts (2008) report respectable reliability of $\alpha = .68$ in one study for proportion based scoring of the 44-item multiple-choice, and $\alpha = .65$ for the 30-item multiple-choice version in a second study. In comparison with the first study however, the 30-item version used in the second study attained $\alpha = .77$ with the 30 common items of the STEM used in study 1. They report that the STEM predicted academic achievement as assessed by the first semester psychology grades attained by participants, and retrospective satisfaction with life as measured by the Satisfaction with Life Scale (SWLS: Pavot & Diener, 1993). In addition, it related to Anxiety and Stress as measured by the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995). Finally, they report a negative association with the Externally-Oriented Thinking subscale of the Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994).

To summarize, measurement of EI has been a complex task, undertaken by theorists with various outlooks regarding its nature. In spite of these dissimilarities, there have been some successes, by virtue of which EI could be considered as a mental ability (cf. Fellner, 2006; Fellner et al., 2007; MacCann & Roberts, 2008; Mayer et al., 2000). Nevertheless, even though many EI researchers accept the foregoing body of validation research as sufficient to accept EI as a new construct, which yields information about individuals over and above that which is available from personality and general intelligence measures, others to not. In the next section I will discuss alternate points of view regarding the rigor of existing validation evidence, and the requirements demanded by EI critics.

Critical View of Emotional Intelligence

While some evidence supports the validity of a number of EI measures, the concept is still relatively new and researchers remain skeptical regarding its empirical value. At issue is whether EI is a new, unitary construct, or just a new label for older constructs falling under the purview of personality and intelligence (cf. Matthews, Zeidner, et al., 2002). According to these critics, sound empirical evidence would consist of the same kind of rigorous psychometric testing demanded for acceptance of other psychological constructs. Specifically, they call for testing with respect to reliability; and construct, content, and predictive validity, which encompasses convergent and discriminant validity. They question whether the evidence discussed above constitutes the exactitude necessary to attain such validation. Required, they say, are measures that differentiate individuals at each level of EI, thus yielding normal distributions of ability at high, middle, and low EI levels, as is required for validation of other constructs. Also necessary is convergent and discriminant validation as delineated by Campbell and Fiske (1959).

Development of psychometrically sound measures of EI is especially complicated not only because of the challenge of creating suitable test items, but also because item scoring can lead to potential confounds (Matthews, Zeidner, et al., 2002). Judging the suitability of test items is complicated because what constitutes a "correct" answer on an item may depend greatly upon the method of scoring. Consensus judgment might very well disagree with expert judgment. In addition, self-report questionnaires are particularly vulnerable to response bias. Matthews, Zeidner, et al. insist that test developers strictly adhere to their theoretical conceptualization of EI as they create items, choose scoring methods, and differentiate EI from other personal characteristics.

In their critique of EI measurement issues, Matthews, Zeidner, et al. (2002) consider both performance-based and self-report measures. Their review includes the MEIS (Mayer et al., 1999) and the MSCEIT (Mayer et al., 2002) in the performance-based category; and the Emotional Quotient Inventory (EQ-*i*; Bar-On, 1997) among several in the self-report category. Each of these measures was introduced above; however, to illustrate the problematic psychometric properties plaguing EI measures in general, I will address the EQ-*i*.

Embedded among the 15 subscales and five higher-order factors contained in the EQ-*i* are four social desirability validity indicators (Bar-On, 1997). Internal consistency and test-retest reliability have been replicated by independent researchers, but factor analyses have been contradictory. According to Matthews, Zeidner, et al. (2002) one solution yielded 10 factors, not 15; and their own produced three factors: self-esteem (11 scales), empathy (3 scales), and impulse control (1 scale). In addition, while Bar-On (1997) presents a respectable amount of validity evidence he does not demonstrate that the EQ-*i* provides incremental predictive power with respect to personality. In fact, the EQ-*i* relates strongly with personality traits of the Five Factor Model (Dawda & Hart, 2000). With respect to intelligence, Matthews, Zeidner, et al. (2002) point out that the measure correlates near zero with IQ, and in an independent validation study it did not predict cognitive ability or academic achievement. These properties, combined with those detailed in the foregoing analyses, suggest that the instrument might simply be a glorified personality measure.

The EQ-*i* (Bar-On, 1997) illustrates many of the obstacles to assessing personality by self-report, namely it overlaps considerably with conventional dimensions of personality, its factor structure is poorly defined, and it lacks the ability to truly identify a unique set of competencies. In fact conceptually, the questionnaire seems merely to restructure the Big Five

personality traits while combining them with desirable organizational attributes such as achievement orientation and leadership, which appear in the social psychology, business, and management literatures. Other questionnaire measures of EI, many of which are available for commercial use in organizational settings, share these limitations (see Matthews, Zeidner, et al., 2002). In contrast however, some scales, such as the TEIQue and TMMS reviewed above, have shown the ability to predict criteria associated with social-emotional functioning over and above personality. Consequently, questionnaire methods of studying EI should not be rejected out of hand; some self-report EI measures have undeniably demonstrated their potential usefulness.

Another criticism offered by Matthews, Zeidner, et al. (2002) is that many validation studies use other self-report measures of constructs like psychological well-being, alexithymia and satisfaction with life (cf. Brackett & Mayer, 2003; Saklofske, Austin, & Minski, 2003). This generates concern that common method variance (i.e., using questionnaires as both predictor and criterion), or, indeed, content overlap between predictor and criterion measures might inflate criterion validity for the EI scales. Unfortunately, there is a general lack of research evaluating EI levels with respect to objective behavioral data. Suitable studies should employ tasks which produce objective performance-based data and demonstrate that EI can offer incremental information about individuals as compared with data gleaned from existing personality measures.

In one such study, Fellner (2006) sought to ascertain whether high levels of EI might help security personnel to quickly determine whether a suspect is a terrorist. She presented 180 undergraduate participants with a computer-based multiple-cue discrimination-learning task requiring them to decide which of a series animated characters had been designated as terrorists. Participants operated in one of three cue conditions in which the identifying cues consisted of (1) a positive or (2) negative facial expression of emotion, or (3) a non-emotional attribute. For each

character that appeared on the computer screen, a prompt asked, "Terrorist?" to which participants responded by mouse-clicking "yes" or "no." Participants received feedback on each trial as to whether they had responded correctly. Performance data consisted of the number of errors committed over 100 trials. In addition to performance data, status of trait EI, personality and general cognitive ability were measured pre-task; and subjective stress state was measured before and after the computer task. Results indicated that participants learned faster with emotional cues, but that EI and personality failed to predict their performance. However, EI was found to predict the subjective stress state participants experienced during the task, which in turn, predicted their rate of learning with emotional stimuli. Fellner concluded that while EI did not directly predict performance on this cognitive task, it was still useful in its role as a predictor of subjective stress states in security personnel and consequently, their ability to attend to cues that are relevant to a suspect's status.

In another study, Fellner and her colleagues (2007) investigated whether high EI would predict superior detection and processing of facial expressions of emotion. This study consisted of two tasks: (1) a controlled visual search for specified facial expressions of emotion (happiness, sadness, anger, fear, surprise, and disgust; Ekman & Friesen, 1975), and (2) identification of micro-expressions of emotion (i.e., emotions displayed for 200 ms). First, participants completed a battery of self-report EI and personality measures, and cognitive ability tests. After the task they completed a coping scale which indicated whether they used task-focused, emotion-focused, or avoidance strategies in dealing with the stress induced by the tasks. Results indicated that enhanced performance was associated with higher conventional intelligence, the Big Five personality trait, openness, and the use of a task-focused coping strategy. Specifically, high scorers on these measures performed the visual search faster and

more accurately; and were more accurate in detecting micro-expressions of emotion. Again with respect to EI, Fellner et al. (2007) pointed out its utility in predicting stress tolerance, and suggested it would be a good selection tool for security agents. On the basis of the foregoing findings, it was suggested that EI could be a useful tool in selecting workers for high-stress jobs.

In summary, some EI measures have been of questionable use in demonstrating incremental abilities above personality and general intelligence (e.g., the EQ-*i*), while others have shown promise (e.g., the TMMS and MSCEIT). Fellner (2006; also see Fellner et al, 2007) tried a different approach, using trait EI measures to correlate with cognitive performance and subjective state during performance. The study reported in this dissertation was designed to replicate the findings with respect to learning to process facial emotion, and extend the empirical investigation of EI into an organizational application involving the effects of EI on task performance in a collaborative vs. competitive context. But first I introduce the topic of teamwork and present a brief history and discuss some theoretical perspectives.

Teamwork

The magnitude of task requirements in many work settings today is such that individuals can no longer perform them on their own. (Paris, Salas, & Cannon-Bowers, 2000). Consequently, organizations are going to a team-based method of performing tasks in order to improve service, quality, and productivity (Brown, 2003). Accordingly, researchers and practitioners have long been searching for the ideal method for improving effectiveness in teams (Brown, 2003; Paris et al., 2000).

A first step in discussing teamwork must include an explanation of what is meant by the term *team*. Archer (2004) explicitly states that while most organizations operate in some mode involving work groups the mere existence of those groups is not sufficient to dub them "teams."

Moreover, Paris et al. (2000) explicitly state that "teams are more than collections of individuals" (p. 1052), and subscribe to the conception of a team as a "distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform, and who have limited life-span membership" (Salas, Dickinson, Converse, & Tannenbaum, 1992). Indeed, the attributes Paris et al. believe are needed to discriminate groups of workers as teams include: (1) integrating information from multiple sources; (2) successfully performing interdependent tasks; (3) coordinating among members; (4) valuing common goals; (5) fulfilling one's specialized roles and responsibilities; (6) using and sharing knowledge relevant to the task at hand; (7) exhaustively communicating that knowledge to team members; and (8) using adaptive strategies in order to respond effectively to change. When groups of workers embody these characteristics they can be said to be engaged in teamwork. Next, I present a brief history of teamwork research and the series of theoretical underpinnings on which it was based.

Teamwork Research: A Brief Overview

The investigation of team processes (i.e., teamwork research) began under military auspices in the 1950s and 1960s to study flight crews in aircraft cockpits (Paris et al., 2000). At issue was an attempt to devise teamwork strategies aimed at enhancing the performance of aircrews. Specifically, interest was focused on facilitating performance when aircrews were experiencing inordinately high levels of stress, operating under excessive time pressure, and receiving degraded (i.e., unclear or incomplete) information. Investigation was also intended to reveal the dangerous consequences resulting from actions executed in these situations. Understandably, a considerable degree of the momentum for teamwork research in the military venue throughout the 50+ years of its existence has been provided by the prevalence of highly

salient catastrophes such as military and aircraft accidents. It was hoped that these research efforts would lead to improved safety, and a decreased number of crashes.

Theories in Teamwork Research

Over the time span that teamwork research has been conducted a diverse set of theories have been developed by researchers from different theoretical perspectives (Paris et al., 2000). In the beginning these theories were primarily descriptive in nature, though some developed into normative guidance systems attempting to enhance team performance. In general, the majority of teamwork theories have entailed an input-process-output perspective. This approach regards individual, team, organizational and environmental characteristics as system input; team member communication, adaptation, and orientation as the team processing system; and team productivity as system output. A number of theories include feedback mechanisms, which afford dynamic change and improvement to the system (Ilgen, 1999). Current understanding of teamwork is afforded by a number of representative theories, which fall into eight primary categories, which I describe next.

The social psychological approach to teamwork research considers how social and psychological processes affect the manner in which team members interact with each other and how they affect team outcomes. Hackman's (1983, 1987) Normative Model of Group Effectiveness exemplifies this approach. The sociotechnical approach considers how work-related and technical issues impact team processes and outcomes. Representing this approach, Kolodny and Kiggundu (1980) offer the Dynamic Interactions model and describe its use in forestry; and Pearce and Ravlin (1987) discuss the development of the Self-Regulating Work Groups model. The ecological approach addresses teamwork from the standpoint of how team members relate with each other in the context of their organization or work environment.

Sundstrom and Altman's (1989; also see Sundstrom, DeMeuse, & Futrell, 1990) Group and Organizational Boundaries theory illustrates this approach. The human resource approach considers how team member skills and abilities are drawn upon in the service of team productivity. Shea and Guzzo's (1987) Human Resource Management model speaks to this perspective. The technological approach specifies the use of teams and teamwork as they relate to progress in technology or in applied science and industry. Goodman, Ravlin, and Schminkle's (1987) model of Technological and Organizational Variables exemplifies this approach. The lifecycle approach has to do with the changes that occur in teams due to their growth and maturation over their lifecycles. Morgan, Salas, and Glickman's (1994) Team Evolution and Maturation Model (TEAM), and Gersick's (1988) Time and Transition Model cover this approach. The functional approach considers teams and teamwork from the perspective of task orientation and how team members' roles play into team performance and expected outcomes. Naylor and Dickinson (1969) and Fleishman and Zaccaro (1992) offer descriptions of this approach. And finally, the integrative approach draws upon a number of different approaches in specifying the most effective composition of teams in organizations. Gladstein (1984) offers the Task Group Effectiveness Model, and Campion and his colleagues (Campion, Medsker, & Higgs, 1993; Campion, Papper, & Medsker, 1996) assumed a work design perspective with respect to groups in formulating their Work Team Design model.

Competencies for Successful Teamwork

Another important focus of teamwork research has been the search for the knowledge, skills, abilities, and other characteristics (KSAOs) that make it possible for individuals to come together in order to coordinate, communicate, strategize, adapt, and synchronize information that is pertinent to task accomplishment and mission success (Paris et al., 2000). In the 1970s

teamwork research continued in the military setting, but the focus broadened to include issues such as team orientation, distribution of resources, timing, coordination of responses, motivation, and morale.

In the 1980s the focus grew to consider a number of new facets of teamwork. Among them were Bandura's (1986) theory of collective self-efficacy; Kleinman and Serfaty's (1989) investigation of explicit vs. implicit coordination of activities; and Oser, McCallum, Salas, and Morgan's (1989) findings regarding motivational reinforcement and provision of tasks. Moreover, Morgan, Glickman, Woodward, Blaiwes, & Salas (1986) specified a number of team-specific skill dimensions such as giving and accepting suggestions or criticism; communicating, coordinating, and cooperating with team members; and regulating team spirit and morale.

Throughout the 1990s, the body of teamwork research continued to grow, seemingly exponentially based on the number of teamwork competencies Paris et al. (2000) pronounced to be noteworthy. They include: mutual performance monitoring (Hackman, 1990); conviction regarding the value of teamwork (Gregorich, Helmreich, & Wilhelm, 1990); collective orientation (Driskel & Salas, 1992); adaptability in the face of novel and unpredictable situations (Prince & Salas, 1993); exhibiting potency in groups (Guzzo, Yost, Campbell, & Shea, 1993); findings regarding the relationship between cohesion and enhanced performance (Mullen & Cooper, 1994); the ability to perform self correction and the use of closed-loop communication (McIntyre & Salas, 1995); exhibition of assertiveness in the team environment (Smith-Jentsch, Salas, & Baker, 1996); and the ability to predict team members' behavior due to cross training (Volpe, Cannon-Bowers, Salas, & Spector, 1996). Paris et al. (2000) also emphasize four particular skill dimensions investigated by Smith-Jentsch and her colleagues (Smith-Jentsch,

Johnston, & Payne, 1998; Smith-Jentsch, Zeizig, Acton, & McPherson, 1998): information exchange, communication, supporting behaviors, and team initiative and leadership.

Given this wide variety of teamwork research, Cannon-Bowers and her colleagues (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Salas & Cannon-Bowers, 2000) specified three categories into which the dimensions of teamwork could be organized. First, *cognitions* entail comprehensive knowledge about the team's task, resources, members, dynamics, and objectives. Second, *behaviors* include various attributes and skills that, applied prudently, enhance team performance. And finally, *attitudes* entail personal and collective beliefs, and the ensuing commitment to team objectives. Essentially, these categories constitute the KSAOs of teamwork.

Paris et al. (2000) argue that the great body of teamwork research conducted in the 1990s served to advance another theoretical perspective that intertwines a great deal of teamwork research currently being conducted, that of the shared mental model. This construct is based on the concept of individual mental models, which are cognitive structures and processes that help us to integrate newly-acquired information with existing knowledge so that we can understand the events in which we participate and interact (Rouse & Morris, 1986; Rumelhart & Ortony, 1977). Paris et al. extend this idea to the team level, asserting that shared mental models afford implicit processing of team-related information, and enable team members to coordinate their individual and group activities much more effectively. These shared mental models reveal to team members the variables they need to address in order to enhance their team's performance. Furthermore, they rightly state that theoretically-motivated empirical evidence is needed to inform and guide attempts to measure teamwork, and consequently, to design effective training

systems. In the next section I discuss concepts that must be considered in order to measure teamwork in the service of enhancing team performance.

Measurement of Teamwork

Measuring teamwork and team performance is necessarily the first step toward evaluating a team's effectiveness and productivity when goals for intervention or improvement exist (Paris et al., 2000). This undertaking is challenging primarily because by its nature, teamwork is multifaceted and dynamic, which makes it very difficult to render reliable and valid measurement (Salas & Cannon-Bowers, 1997). In addition, the processes and skills used in teamwork constitute unseen intervening variables between inputs and outputs, and as such are difficult to quantify (Baker & Salas, 1992). But perhaps most potentially confounding is the evolution of team behaviors throughout the various phases of the team's lifecycle. In evaluating teamwork, it is important to differentiate between team behaviors that stem from interpersonal relationships of team members, and those that arise primarily from task demands and team member roles within the group (Morgan et al., 1986; Morgan, Herschler, Wiener, & Salas, 1993).

The first requirement for developing a teamwork measure is to perform a team task analysis, which ideally, reveals what the team needs to learn (i.e., its learning objectives), and what skills it needs (i.e., its required competencies; Paris et al., 2000). The successful task analysis will ascertain the gestures, actions, events, organizational considerations, and courses of communication required for effective teamwork. In addition, it will elucidate the nature of team task interdependency, and discriminate between tasks appropriate for individuals and those best performed collectively (Salas & Cannon-Bowers, 2000). Regrettably, Paris et al. (2000) complain of a dearth of suitably validated team task analysis methods.

Another requirement for an effective teamwork measure is that it should be firmly based in teamwork theory, have sound psychometric properties, and provide practical information about teamwork (Baker & Salas, 1992). Criteria for such measures include: (1) determining what processes are associated with team productivity; (2) discriminating individual shortcomings from team-level inadequacies; (3) describing team member exchanges in order to capture ever-changing events; (4) producing appraisals which provide specific performance feedback; (5) generating reliable and justifiable evaluations; and (6) supporting functional use.

Of course, one teamwork measure does not fit all situations (Salas & Cannon-Bowers 1997). One type of situation might require that the chosen measure be descriptive in nature, which dictates that it should meticulously describe and document individual as well as team behaviors over the course of team operations. Alternatively, teamwork measures might be evaluative, and thereby critique performance with respect to standards set by some regulatory body in order to determine levels of effectiveness. Or, teamwork measures might be diagnostic, in which case they determine the cause of behavior and identify the mechanisms leading to their occurrence. Through this approach diagnostic measures produce data that can be used to provide feedback, which is required if future performance is to be improved.

An alternative method of categorizing teamwork measures concerns the unit of measurement (Salas & Cannon-Bowers, 1997). These categories pertain to individual-level vs. team-level instruments, and process as opposed to outcome measures. At the individual level, performance measures amount to taskwork measures, assessing the KSAOs of the individuals with respect to individual responsibilities. At the team level, performance measures look at a higher level of functioning, concentrating on how team members coordinate individual requirements and support each other through mutual performance monitoring, open

communication, and error detection and correction. Outcome and process measures necessarily work in tandem such that the former can present evidence that team training was successful; and the latter, if necessary, can elucidate the etiologies of performance problems so they can be addressed should they arise in the future. A caveat regarding outcome and process measures concerns the fact that even if processes are deficient, they can still lead to worthwhile outcomes, so it is prudent to use both.

The type of information and the manner in which it is gathered differs for process and outcome measures. For process measures, experienced evaluators might conduct interviews with team members or engage in direct observation of team processes in order to analyze patterns of team interaction, data flow, and the strategies that team members use to support or thwart team efforts. Alternatively, they may perform task analyses, or create computer or mathematical models so that team processes can be explicated (Dyer, 1984; Meister, 1985). Outcome measures generally solicit the opinion of experts, or record performance with an automated system in order to obtain proficiency ratings for accuracy, completeness and promptitude of team projects (Paris et al., 2000). Outcome measures might also entail gathering information about levels of knowledge enjoyed by team members (Dyer, 1984). While gathering comprehensive information about processes as well as outcomes may seem cumbersome, both are necessary in order to be assured of dependable levels of team performance.

Approaches to gathering team performance information abound, and include rudimentary paper-and-pencil self- and other-report instruments up through highly complex computer-automated data collection systems. Nevertheless, Paris et al. (2000) call for development of "more dynamic measurement systems that allow for on-line assessment of teamwork" (p. 1057). Furthermore, they assert that work on technological systems such as human performance

modeling should be sharply increased so that we can more quickly come to fully understand teamwork and its dynamic nature.

Given this body of information about teamwork theory, the competencies required for effective teamwork, and the approaches to measuring teamwork, it is desirable to use this knowledge toward improving team processes and outcomes. In the next section I discuss three intervention approaches for improving team performance.

Approaches for Team Performance Improvement

Team processes and functioning are important elements in determining how productively a team ultimately performs (Paris et al., 2000). A detailed description of improvement interventions, theory and methods is beyond the scope of this dissertation; however a short summary is in order. Three interventions for enhancing team functioning include team selection, task design, and team training. Team selection involves (a) choosing the right individuals, (b) making the team the right size; (c) making sure the members get along with one another, and individual characteristics are conducive to adapting to team-based work; and (d) keeping the team as stable as possible when personnel changes are required. In addition, depending on the nature and function of the team, it is best to select members with the appropriate variety of skills and abilities so as to ensure the optimal mix for maximal productivity. Task design involves manipulating task design variables at the individual, group, and organizational levels so as to facilitate rather than inhibit team productivity (Paris et al., 2000). Individual variables include such elements as automation, workload, and time pressure; group variables include team structure and established procedures; and organizational variables include organizational policies and governmental regulations. Team training, very simply, is the act of consolidating the knowledge, skills and strategies teams use to coordinate the individual and group tasks that

comprise team performance, and working to transform them into controlled behavioral processes (Paris et al., 2000). This involves deciding what should be trained, how to undertake the training, including consideration of the tasks plus specific teamwork knowledge, skills and attitudes (Salas & Cannon-Bowers, 2000); whether a part or whole training method should be used with respect to individual and team skills (Salas et al., 1992); and implementation of performance feedback (Salas et al., 1992).

The foregoing overview of teamwork has covered its definition, an abbreviated history, some theoretical underpinnings, its measurement, and approaches for its improvement. These have been presented primarily from the perspective of authors conducting research in laboratories, in military environments. However, teamwork has also played an influential role in organizational venues. I turn next to a discussion of teamwork in organizations.

Teamwork Research in Organizational Settings

Teamwork research in organizational settings has roots in group research, historically a major focus of social psychology. Small group research from the 1940s to the early 1960s was conducted principally under this discipline, and mainly in controlled laboratory settings using temporary groups created specifically for the experiments (McGrath, 1997). In North America through those years, McGrath identifies three theoretical perspectives guiding small group research, each identified by the institution where early advocates of the research resided. The Michigan school (University of Michigan) conceived of groups as social systems whose function consisted of influencing members (e.g., attitude change) and includes Festinger's theories of social comparison and cognitive dissonance (Festinger, 1954, 1957); and Thibaut and Kelley's (1959) exchange theory. The Harvard school conceived of groups as intact social systems which afforded the ability to model the interactions of group members (e.g., providing patterned

sequences of various group processes). It included Bales' (1950) interaction process analysis (IPA) theory and Thelen and colleagues' work on emotionality in groups (Thelen, 1954). The Illinois school conceived of groups as social systems whose purpose was task performance and includes research on groups in military (Roby & Lanzetta, 1956), sports (Fiedler, 1964) and legal (Davis, 1973) settings.

The late 1960s and early 1970s saw a decline of small group research under the discipline of social psychology, about which McGrath (1997) opines that limits were being reached as to what else could be learned. However, he also points out a parallel rise small group research in other disciplines such as organizational psychology, political science, and speech communication. Periodic reviews of small group research since the early 1970s have revealed this changing nature of the focus of group research.

In a review of small group research from 1967 to 1972, Helmreich, Bakeman, and Scherwitz (1973) complained of an abundance of data but a lack of theorizing, asserting that many questions but few answers were being generated. Much of the focus of their review was on individual processes such as attraction (Aronson, 1969), love (Rubin, 1970), conformity (Berry, 1967), social influence (Janis, 1972), and bystander intervention (Darley & Latané, 1970). With respect to group research in organizations they highlighted some work on task performance in a variety of organizations such as the military (O'Brien & Owens, 1968) and a research organization (Friedlander, 1966). However, very few of the studies related to work in companies. Some research that anticipated the move to organizational psychology includes work on leadership (Fiedler, 1967) and encounter groups (Egan, 1970) whose focus was sensitivity training, and which eventually gave rise to quality circles (Marks, Mirvis, Hackett, & Grady,

1986). Helmreich et al. concluded with a prediction of increased emphasis on research regarding the *processes* (their emphasis) in groups.

In a 1982 review, McGrath & Kravits (1982) divided group research into two main categories, task performance and social interaction. For the purposes of this dissertation I will concentrate on the body of work pertaining to task performance. McGrath and Kravitz divided task performance into four types: (1) intellective tasks, (2) decision making tasks, (3) cognitive conflict tasks, and (4) mixed-motive tasks. Intellective tasks are ones that involve solving problems that are considered to have correct answers (cf. Laughlin, 1978). The answers themselves are usually determined by consensus of a number of individuals who are considered to be expert in the topic at issue. Decision making tasks are tasks in which groups seek to identify a *preferred* answer, rather than one that is strictly right or wrong. Exemplars in this category include investigations of mock juries (cf. Davis, Kerr, Stasser, Meek & Holt, 1977; Kerr, 1978) and choice shifts or polarization (cf. Burnstein & Vinokur, 1977; Myers & Lamm, 1976). Cognitive conflict tasks are ones that try to ascertain the reasons for impediments to group decision making, which are caused by intellectual conflict among group members. In this vein, Hammond, Stewart, Brehmer, and Steinmann (1975) developed social judgment theory in an attempt to find ways to attenuate these cognitive conflicts.

McGrath and Kravits's (1982) final category, mixed-motive tasks, entails a wide variety of tasks that fall into three sub-categories: (a) bargaining and negotiation, which is itself highly multifaceted, (b) dilemmas, and (c) coalition formation. Bargaining and negotiation has been studied with respect to gender differences (Kimmel, Pruitt, Magenau, Konar-Goldband, & Carnevale, 1980), cooperation vs. competition (Lewis & Fry, 1977), personality differences (Hermann & Kogan, 1977), payoffs (Schulz & Pruitt, 1978), social relationships with one's

negotiation adversary (Tjosvold, 1977), significant third parties (Breaugh & Klimoski, 1977), situational factors (Lewis & Fry, 1977; Schulz & Pruitt, 1978), and a variety of bargaining tactics and strategies (Hamner & Yuki, 1977; Lindskold, 1978; Wall, 1977). Investigation regarding dilemmas during this time included the prisoner's dilemma, which was studied with respect to its ability to help in answering particular conceptual questions (e.g., Chertkoff & Lane, 1978), matrix games (Kelley & Thibaut, 1978), N-person dilemma games (Komorita, 1976), social traps (Brechner, 1977) and public goods (Marwell & Ames, 1979). And finally, coalition formation received a lot of research attention during this time period, but it was not addressed to the organizational environment.

In a 1990 review, Levine & Moreland (1990) divided the topic of progress in small group research into five different categories, discussing their (1) ecology, (2) composition, (3) structure, (4) internal conflicts, and (5) performance. Performance, upon which this dissertation is focused, is further subdivided into (a) leadership, (b) decision making, and (c) productivity. I will focus on this last topic. According to Levine and Moreland, team productivity has to do with the group producing some tangible outcome (e.g., a product or service) with the condition that the outcome can be measured with respect to its quality. As such, the efficiency with which this production is effected principally determines the overall effectiveness of the organization at large. Gladstein (1984) and Hackman (1987) offered theoretical analyses of the productivity of groups in organizations, though Goodman et al. (1987) urged for the development of more specific definition of group effectiveness and for consideration of how a group's effectiveness is affected by its task and technology, cohesion and norms (Levine & Moreland, 1990). Other factors influencing group productivity include social loafing, motivation and coordination, and leader behavior. While social loafing had been found in laboratory experiments with respect to

cognitive (Harkins & Petty, 1982) and physical (Williams, Harkins, & Latané, 1981) tasks, it was much less robust in work settings. Findings revealed that it could be ameliorated by acknowledging the unique contributions of group members (Harkins & Petty, 1982), making it easy to evaluate group members' contributions (Harkins & Szymanski, 1987), making group members accountable for their work (Weldon & Gargano, 1988), and making the task attractive (Zaccaro, 1984). With respect to motivation and coordination, Buller (1986) investigated a number of team development activities intended to enhance the task and relational skills of group members, including role analysis, problem identification, and sensitivity training. Marks and his colleagues (Marks et al., 1986) investigated the influence of quality circles on worker productivity and markers of job satisfaction; and Goodman, Devadas, and Hughson (1988) studied the degree to which autonomous workgroups afforded group members control of their tasks. Additional work aimed at improving productivity includes Pearson's (1987) evaluation of participative goal setting; Mackie and Goethals' (1987) investigation of how concurrence of individual and group goals influences the group's performance; and Salancik and Pfeffer's (1978) investigation of how group productivity is impacted by the perceptions group members have of the task for which they are responsible.

Group research during this period also involved investigating the attributions group members have for their success or failure, which can be egocentric (Miller & Schlenker, 1985), sociocentric (Adams, Adams, Rice, & Instone, 1985), or even more complex (Zaccaro, Peterson, & Walker, 1987). And finally, the rules for allocating the group's rewards and costs among its members are an important consideration. This can be determined by group factors (e.g., morale and success; Elliott & Meeker, 1986), recipient factors (e.g., need and performance; Tindale & Davis, 1985), or allocator factors (e.g., values and motives; Stake, 1983).

Levine and Moreland (1990) clearly illustrate the ascendency of teamwork research in organizational settings that occurred during the 1980s, and the migration of its focus to disciplines other than social psychology, particularly organizational psychology. They concede the importance of small groups for researchers and practitioners in that field. Accompanying the shift of disciplines was a shift in methodology, from laboratory experiments, which typically assessed simple behavior, to field research and observational analyses of natural teams, whose behavior is much more complex and inherently intermingled with multifaceted contextual factors. Levine and Moreland conclude with a wistful observation that, "groups are alive and well, but living elsewhere" (p. 620).

In their review of research from 1990 to 1995, Guzzo and Dickson (1996) pointed out a change in terminology in the literature: "small group" research was now denoted "team" research consistent with its changing nature and venue. Furthermore, whereas previous small group research reviews had taken a broad view, Guzzo and Dickson focus specifically on team performance in organizational settings, particularly that involving team effectiveness in the work place. They define effectiveness broadly, as did Hackman (1987) and Sundstrom, DeMeuse, and Futrell (1990), and measure it by (1) the quality of the group's output (e.g., its quality or quantity, speed of production, ability to satisfy customers, etc.), (2) the impact the group has on its members, or (3) the group's growth in performance ability over time.

Guzzo, and Dickson (1996) report on a selection of team research issues of long-standing importance to group performance. These include cohesiveness, group composition, leadership, motivation, group goals, among others. In general, cohesiveness is associated with enhanced performance (Evans & Dion, 1991) and has been found in senior management teams (Smith, Smith, Olian, Sims, O'Bannon, & Scully, 1994), as well as military teams (Zaccaro, Gualtieri, &

Minionis, 1995). Group composition effects were mixed (Guzzo & Dickson, 1996). In general, increased size (Campion, Medsker & Higgs, 1993) and heterogeneity (Magjuka & Baldwin, 1991) were beneficial to a point, especially for intellective and creative tasks (Jackson, Brett, Sessa, Cooper, Julin, & Peyronnin, 1991). Conversely, for senior managers in the banking industry, heterogeneity was associated with higher turnover (Jackson et al., 1991). Group composition also entails the association between familiarity and performance. Positive associations have been found in coal mining production (Goodman & Leyden, 1991), decision making teams (Watson, Michaelsen, & Sharp, 1991), and health care teams (Dubnicki & Limburg, 1991), though performance returns may diminish over the long term, with familiarity among team members becoming a liability (Katz, 1982). The effect of leadership on performance has been studied in a wide variety of organizations including the Israeli Defense Forces (Eden, 1990), professional baseball teams (Jacobs and Singell, 1993), and the sales environment (George & Bettenhausen, 1990). With respect to motivation, at the group level, Guzzo et al. (1993) showed that group potency was significantly associated with group effectiveness in customer service and other organizations. And at the individual level, Earley (1994) showed that group-focused training influenced collectivistic individuals more strongly, while self-focused training influenced individualistic workers more strongly. With respect to group goals, performance is generally affected positively by setting specific and demanding goals (Weldon & Weingart, 1993); planning and expending effort (Weingart, 1992); and communication and cooperation among members (Weldon & Weingart, 1993). In addition, Mitchell and Silver (1990) found that although conflicting individual and group goals can hurt, compatible ones do not necessarily help group performance outcomes over and above what is achieved with group goals alone.

These results are encouraging, and generally affirm constructive effects of many criteria on team effectiveness. However, it should be noted that many of the studies cited are comprised of survey research and correlational analyses rather than empirical studies, and that studies denoted as empirical generally refer to interventions (e.g., Earley, 1994). This does not, however, lessen their utility. On the contrary, field research findings can be used to inform theory and lead to testable hypotheses.

Cohen and Bailey (1997) adopt a taxonomy of four types of teams in organizational settings: (1) work teams, (2) parallel teams, (3) project teams, and (4) management teams. Work teams consist of the individuals in an organization that produce the goods or provide the services offered by the organization. Membership in these groups is usually clearly defined, full-time, and stable (Cohen, 1991), are used in service organizations as well as manufacturing firms, and are typically led by supervisors who direct all facets of the task work. Self-directed or semi-autonomous work teams are also on the rise (Cohen & Bailey, 1997). These put more decision making responsibility into the hands of team members, and typically cross train their members in the skills required of the team. Parallel teams gather individuals from various parts of the organization to perform tasks that are difficult for the regular organization to accomplish (Stein & Kanter, 1980). They operate in parallel with the official organizational structure and typically work on problem-solving and process improvement tasks. Project teams remain together for a limited amount of time and produce a specified deliverable, for instance a new product or service (Cohen & Bailey, 1997). Their members are generally drawn from a variety of disciplines and functional units in the organization in order to draw upon specialized expertise for the targeted product or service. When the goal of the project team has been completed, it typically disbands, and its members return to their normal jobs, or start a new project.

Ilgen, Hollenbeck, Johnson, and Jundt (2005) note a number of methodological developments in teamwork research from 1996-2004. These include techniques involving multiple levels of theory and analysis (cf. Klein & Kozlowski, 2000), computer simulations of real-world phenomena which capture and time stamp team member behaviors (Schiflett, Elliott, Salas, & Coovert, 2004), the development of mathematical and computational models that afford assessment of the dynamic nature of teams and task work (Losada, 1999), and the use of social network analysis to study the impact of larger social patterns on inter- and intra-team behavior (e.g., Burt, 2000). Ilgen et al. also note that a number of theoretical advances occurred during the time period, notably the change in focus from linear input-process-output (I-P-O) models to mediational models. These incorporate as input to other processes the effects of emergent cognitive or affective states, and result in an input-mediator-output-input (IMOI) framework, thus acknowledging the importance of these interactions. Predictably, much empirical research during this time recognizes these interactions, incorporating potential feedback loops and the non-linearity of work done by teams.

Ilgen et al. (2005) organize their review from a temporal perspective, categorizing teams by their stages of formation, functioning and finishing. Each of these in turn involves mediational processes at affective, behavioral and cognitive levels. Taking into consideration their updated IMOI model, they present research findings in each.

In the forming, or initiation stage affective processes are related to trusting, and include potency (e.g., collective efficacy, group efficacy, and team confidence) and safety (i.e., physical and psychological) processes. With respect to potency, research findings showed increased performance in teams, usually through mediating variables (cf. Chen et al., 2002; Durham, Locke, Poon, & McLeod, 2000), in environments subscribing to transformational leadership

(Sivasubramaniam, Murry, Avolio, & Jung, 2002), and when tasks were familiar (Marks, 1999). With respect to safety, psychological safety related to enhanced performance (Edmondson, 1999), and further, led to physical safety in the work environment when coupled with the act of communicating about unsafe practices (Hofmann & Stetzer, 1996). Behavioral processes in the forming stage involve planning (i.e., information gathering and strategy development; Ilgen et al., 2005). In general open communication related to enhanced team performance (Hyatt & Ruddy, 1997), especially for teams containing within-person diversity (Drach-Zahavy & Somech, 2001) and during periods of high workload (Stout, Cannon-Bowers, Salas, & Milanovich, 1999). Cognitive processes in the forming stage involve structuring (i.e., developing and maintaining norms, roles and relational patterns among team members). Shared mental models have been associated with enhanced team performance through communication and coordination as mediating variables (Marks, Sabella, Burke, & Zaccaro, 2002; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000), as has transactive memory (i.e., an amalgamation of the knowledge each team member possesses and a shared understanding of who knows what; Lewis, 2003).

In the functioning stage affective processes involve bonding (Ilgen et al., 2005), which is important for team performance especially when task interdependence is high (Beal, Cohen, Burke, & McClendon, 2003). In this vein, managing diversity of membership is important (Riordan & Shore, 1997), especially as the group ages together (Harrison, Price, & Bell, 1998; Harrison, Price, Gavin, & Florey, 2002). Additionally, managing conflict among team members is important, and mounting evidence suggests that teams perform best under conditions of (a) intense, unemotional debate in a trusting environment (Simons & Peterson, 2000), (b) freedom to express doubts and change minds (Lovelace, Shapiro, & Weingart, 2001), and (c) resistance of

pressure for an early compromise (Montoya-Weiss, Massey, & Song, 2001) or premature

consensus (Choi & Kim, 1999). Adapting (e.g., to novel conditions and workload sharing) is the

behavioral component of the functioning stage. In general, adaptability enhances team

performance (Waller, 1999), although some contextual effects have been identified (e.g., Moon

et al., 2004); and helping and workload sharing are most likely when help legitimately needed

(Porter et al., 2003). Learning is the cognitive component of the functioning stage and can be

gained from minority and dissenting team members (Gibson & Vermeulen, 2003), or the team's

best member (Lavery, Franz, Winquist, & Larson, 1999; Littlepage, Robison, & Reddington,

1997), but only if there is a formal plan to ascertain this information (Humphrey, Hollenbeck,

Meyer, & Ilgen, 2002).

Finishing is the stage at which the team breaks up because the purpose for which it was

formed has been accomplished (Ilgen et al., 2005). A number of theorists have incorporated this

stage into their team development models (e.g., Tuckman & Jensen 1977; van Steenberg

LaFarge, 1995; Worchel 1994), and others generally agree that the final stages of teams and

teamworking are important (cf. Arrow, McGrath, & Berdahl, 2000; Gersick 1988; Marks,

Mathieu, & Zaccaro, 2001). However, there is virtually no representation of this stage in the

empirical teamwork literature (Ilgen et al., 2005).

In concluding, Ilgen et al. (2005) lament that there are fewer empirical studies than could

be desired, speculating that pragmatics currently outweigh the need for theory development.

They concede the need for programmatic research in many settings including industry, the

military, and multi-national virtual organizations, and are optimistic that, influenced by recent

theoretical development, methodological work will greatly increase in the future.

This foregoing review shows how the complexity of teamwork in organizations has grown over the past 20 years, with ever more criteria being considered as influencing the effectiveness with which teams operate. One such factor is EI. I now turn to a description of how EI and teamwork intersect.

Intersection of Emotional Intelligence and Teamwork

The Popular Notion of EI in Organizations

The implications for EI in the workplace were suggested in Goleman's (1995) popular book, and were specifically targeted in his 1998 book about EI in the workplace (Goleman, 1998). Citing examples from many national and international companies, Goleman asserts that EI can benefit workers at many levels of organizational operations. At the temporal level, he claims that even before a worker gets hired, EI is important in the attributes being sought by managers and human resources executives; those *with* EI skills are more likely to get hired (Dowd & Liedtka, 1994). At the hierarchical level, there is much stress on managers and CEOs having good EI skills, but equally important is the necessity for frontline workers (Hunter, Schmidt, & Judiesch, 1990). Goleman claims that emotional competencies are what differentiate the top-most performers. Furthermore, depending on the complexity level of the job, production levels for the top performers can result in three to 127 times as much output for workers in the top 1% as opposed to those in the bottom 1% (Hunter et al., 1990). And at a job classification level, Goleman claims that in a database containing models of competent performance for 181 different jobs in 121 different companies and organizations throughout the world, two-thirds of the skills and abilities regarded as necessary to perform effectively consisted of emotional competencies. These are indeed dramatic assertions, and they paint EI in a very favorable light; however, they are claims based on a conceptualization of EI as a construct consisting of very

loosely defined personal (e.g., self-confidence, trustworthiness, initiative) and social (e.g., service orientation, influence) characteristics.

With respect to teams and teamwork, Goleman (1998) argues that the team mind has the capacity to be more intelligent than the best individual, and that emotional intelligence is the mechanism that can afford the ability of the team mind to "think and act brilliantly" (p. 204). From the perspective of an organizational manager, this would potentially be good news—it offers a seemingly concrete way to enhance team performance. However, from an empirical perspective, a detailed examination of Goleman's claim shows that even when he cites empirical evidence, he overgeneralizes the results reported by the researchers (e.g., those of Campion, Papper, & Medsker, 1996), and inappropriately implies a causal effect for EI. I now turn to a description of empirical findings regarding EI and teamwork.

Empirical Findings Regarding EI in Organizations

Emotions in the workplace

Scholarly research on EI in organizational settings has roots in the body of research investigating emotions in organizational settings (Ashkanasy, 2002), which itself began a modest rise in the late 1980s following publication of works such as Hochschild's (1983) *The Managed Heart: The Commercialization of Human Feeling*, and Rafaeli and Sutton's (1989) "The Expression of Emotion in Organizational Life." The 1990s witnessed a number of important publications, including Fineman's (1993) *Emotions in Organizations*, and Weiss and Cropanzano's (1996) "Affective Events Theory: A Theoretical Discussion of the Structure, Causes and Consequences of Affective Experiences at Work." And, as mentioned above, Goleman's (1995, 1998) offerings brought EI to the masses. With the new millennium, however, research on emotions in organizational settings has dramatically increased, as reflected by the

accumulation of books (e.g., Ashkanasy, Härtel, & Zerbe, 2000; Ashkanasy, Zerbe, & Härtel, 2002; Fineman, 2000; Härtel, Zerbe, & Ashkanasy, 2004; Payne & Cooper, 2001), and special editions of important journals like the *Journal of Organizational Behavior* (Fisher & Ashkanasy, 2000), *Organizational Behavior and Human Decision Processes* (Weiss, 2001), *Leadership Quarterly* (Humphrey, 2002), and *Human Performance* (Ashkanasy, 2004) dedicated to the topic. The topics that fall under the umbrella of emotions in the workplace are multifaceted, as a survey of the contents of the above publications will demonstrate. For the purpose of this dissertation, I will concentrate on EI in organizational settings, specifically as it relates to teams, teamwork, and performance.

EI and Performance in Organizations

Working from the perspective of Mayer and Salovey's (1997) model of EI, Jordan, Ashkanasy, Härtel, and Hooper (2002) questioned whether EI would predict performance of a workgroup. Thinking it best to measure EI in the workplace using an instrument specifically tailored to the workplace, they developed the Workgroup Emotional Intelligence Profile (WEIP-3) to investigate whether EI would predict the goal focus and process effectiveness of teams in a work setting. As part of this study they collected data to determine convergent and discriminant validity with respect to a number of existing scales: the Self-Monitoring Scales (Lennox & Wolfe, 1984); the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995); the Interpersonal Reactivity Index (IRI; Davis, 1994); the Job Associate–Bisociate Review Index (JABRI; Jabri, 1991); and Emotional Control Scale (Riggio, 1986).

Jordan et al. (2002) assigned 448 Australian undergraduates taking a managerial skills and communication course to work in so-called "semi-autonomous learning teams" (p. 203), each consisting of three to seven class members. Course work and assignments were presented in

a style corresponding to a work setting, and the teams submitted reports regarding their team meetings on a weekly basis for nine weeks during the 14-week semester. The validation measures were presented as a "self-awareness" facet of the course and were administered over the course of the semester; the WEIP-3 was administered when the team members had been working together for about 12 weeks.

Results showed that the WEIP-3 displayed the predicted convergent and discriminant validity with respect to the existing measures of EI and related constructs that they used. In addition, they found that, based on WEIP-3 scores, average team EI predicted team performance. Furthermore, in a comparison of 15 high-EI teams with 15 low-EI teams, the low-EI teams improved significantly for Goal Focus (GF) and Process Effectiveness (PE), and finished up with scores comparable to those attained by high-EI teams. However, while the high-EI teams started out with high GF and PE, they did not improve significantly during the semester. Based solely on this study, Jordan et al. (2002) hesitate to conclude definitively that EI was the sole reason for improvement in the low-EI teams. They do, however, speculate as to reasons for the enhanced performance of the low-EI. These include training, increased familiarity with team members over time, and the possibility that emergent team leaders' individual skills may have led to the improvement. Ideas for future research included using the designated measures in a pre-post design, and controlling for effects of group dynamics and internal team structure.

Referring to the increase in prevalence of work teams in organizational settings, Jordan and Troth (2004) note that few empirical studies have been conducted regarding the potential association between EI and performance. Consequently, they set out to investigate the effect of EI on individual and team performance of a cognitive problem-solving task, as well as the conflict resolution style adopted by the teams formed for their investigation. Jordan and Troth

contend that the ability to manage one's own emotions and those of other team members affords the linkage between EI and team performance. The implications for team performance are that these abilities to monitor and manage emotions assist team members in sustaining appropriate and effective relationships with each other, thereby contributing to more effectual information exchange and better team decisions. Based on these premises, Jordan and Troth expected that teams would perform the problem-solving task better than individuals, and that high EI would be associated with high team performance on the problem-solving task, but not necessarily with high individual performance on the same task.

Jordan and Troth (2004) also address the issue of the conflict that inevitably arises when individuals work together in teams. This conflict can be either functional, wherein it facilitates performance and creative solutions, or dysfunctional, wherein it delays or deters beneficial outcomes (Brown, 1983). In either case, Jordan and Troth assert, conflict involves emotions and therefore, high EI should lead to more productive conflict resolution strategies. Working from Thomas's (1977) taxonomy of five conflict resolution styles, which range from less to more productive (i.e., dominating or competing; avoiding; accommodating; compromising; collaborating or integrating), they predicted that lower-EI teams would more likely use dominating or avoidance strategies, and higher-EI teams would more likely use collaborating strategies.

Participants for this study were 350 university students drawn from an introductory management course. First, on an individual basis, they completed the WEIP6 (Jordan, 2000) to assess workgroup EI. They then completed the problem-solving task, Lafferty and Eady's (1973) survival scenario exercise, which entailed ranking 15 items as most to least important (i.e., number 1 to number 15) for survival. The quality of the answers was determined by computing

difference scores between the participant's and expert rankings for each item and then totaling the difference scores. Smaller difference scores indicated better performance for the participant.

Participants were then randomly assigned to 108 teams consisting of three members on average (range, 2 to 5 members) and were asked to solve the survival scenario as a team, with the goal of arriving at a consensus regarding the ranking of the 15 items. They had to complete this task within a 15-minute time limit. Some teams finished, others did not. No time extensions were allowed, and time pressure was created by announcing the imminent deadline a few minutes prior to the deadline. When the team exercise was completed, participants were asked to reflect upon the conflict behaviors they and their teammates had exhibited during the survival exercise, and then to complete Rahim's (1983) Styles of Handling Interpersonal Conflict measure, which assessed the strategies participants used to arrive at a team consensus regarding the rankings (i.e., dominating; avoiding; accommodating; compromising; collaborating). Best and worst individual and team performance were determined by comparing participant and team rankings of items with those of several survival experts' rankings (Lafferty & Eady, 1973). Lower difference scores denoted better performance.

Jordan and Troth's predictions regarding EI and performance were supported. EI was not associated with individual performance of the problem-solving task; teams performed better than individuals; and higher-EI teams performed the task better than lower-EI teams. With respect to conflict resolution, their predictions were partially supported. Lower-EI teams used avoidance conflict strategies with respect to their own emotions (as predicted) but not those of others (contrary to prediction). Also contrary to prediction, lower-EI teams did not engage in dominance conflict resolution strategies as compared with higher-EI teams. However, as predicted, higher-EI teams used more collaborative strategies than did lower-EI teams.

Jordan and Troth (2004) concluded that the lack of association between EI and individual performance of the problem-solving task was unsurprising because at that level it constituted a wholly cognitive task, which did not require skills for emotion management. However, transferring the task to the team level introduced an emotional aspect because individual team members entered the team setting with the motivation to defend their individual solutions, thus creating conflict regarding opposing ideas and opinions. The difference in performance outcomes (i.e., the fact that teams produced better solutions than individuals) indicates that team members changed their individual decisions in deference to the team consensus. Jordan and Troth assert that this revealed a greater ability of team members for dealing with their own emotions, a marker for higher EI. With respect to the differential association between EI and conflict resolution strategies, they suggest that due to the short term nature of the task, team members necessarily concentrated on the task at hand and controlling their own emotions in response to conflicts as they arose, rather than also trying to facilitate performance by attempting to control their teammates' emotions. This coincides with Carlopio, Andrewartha and Armstrong's (1997) assertion that self-management skills along with the ability to generate solutions without expressing negative affect firmly support an individual's ability to effectively and appropriately manage conflict, an ability that was necessary to complete the problem-solving task of this study.

Another study in this same vein was conducted by Offermann, Bailey, Vasilopoulos, Seal and Sass (2004). These authors, too, are concerned with the issue of emotion in the workplace and how performance is affected through its agency. In addition, they acknowledge that cognitive ability (CA) or *g* operates in the emotional environment. However, Offermann et al. assert that there is an emotionally relevant ability that can give some individuals an advantage in team and individual performance of cognitive tasks.

Offermann et al. (2004) subscribe to Mayer and Salovey's (1997) ability model of EI. However, they also point out that the body of empirical studies carried out under that framework have concentrated mainly on the abilities of individuals rather than groups or teams in organizational settings. Additionally, they contend that the ability model of EI might fail to capture important emotion-related strengths in the prediction of performance. Thus, while EI is necessary in achieving success in many settings, they believe that it might not be sufficient for the prediction of interpersonal behavior of teams in organizational settings.

For this purpose, Offermann et al. (2004) believe it is necessary to turn to a mixed model of EI, which entails not only the abilities afforded by EI but also the outcomes of those abilities (e.g., understanding and management, *plus* political awareness). Caruso, Mayer and Salovey (2002) admit the value of mixed models in organizational settings, noting that they are very popular with human resources professionals and those in leadership positions. This may stem from evidence that it has advantageously affected bottom line results (Spencer, 2001). Offermann et al. label this broader concept, emotional competence (EC), and assess it using the Emotional Competency Inventory (ECI; Boyatzis & Goleman, 2002), which has been widely used in organizational settings as a skills assessment and development tool.

Offermann et al. (2004) extend previous investigations of the effects of EI on team performance by adding the assessment of CA into the mix, using each participant's SAT score as recorded in his or her college application file as the measure. Similar to Jordan and Troth (2004), they believe that at the individual level, many tasks in work settings draw largely upon CA, but that at the team level, those same tasks draw much more strongly upon team members' ability to get along with each other, work through the task, and come to a team consensus. With respect to performance, while Offermann et al. expected EC and CA both to be positively associated with

performance, they believed that CA would be a stronger predictor of individual academic performance and that individual EC would be a stronger predictor of team performance. They also suggested that, aggregating EC and CA at the team level, mean levels of EC within teams would predict the team's performance better than mean levels of CA. Finally, they expected that individuals on higher EC teams would report more favorable attitudes about their team experience than would individuals on lower EC teams.

Participants consisted of 425 undergraduate business administration majors taking a human relations course. They were randomly assigned to teams containing three to six team members (mode, 5 members; 89 teams). Independent measures included the EC and CA measures discussed above. Dependent measures included a team project grade, and semester exam grades earned in the human relations course in which participants were enrolled; a blizzard survival exercise (the same as used by Jordan &Troth, 2004 above); and an 8-item team attitude survey intended to assess team members' levels of satisfaction, cohesiveness and effectiveness regarding their team.

Results showed that, as expected, CA (i.e., SAT total and subscale scores; verbal and math) significantly predicted average exam grades. However, only the SAT verbal score predicted individual scores on the blizzard survival exercise. EC did not predict average exam grades or individual scores on the blizzard survival exercise. Also as expected, EC predicted team performance better than CA, but contrary to expectations EC did not predict the group blizzard survival score, nor did CA. EC was significantly associated with team project grades and average EC scores were much more strongly related to team and team performance measures than were CA measures. Finally, EC at the individual and group level were significantly positively related to team members' positive attitudes toward their team.

This study clearly demonstrates a link between EC and CA, and team performance. However, in the attempt to determine the unique impact of EI on team performance it shares a limitation common to many studies of this type, namely the failure to control for potential confounds such as established personality traits and cognitive ability of team members. It may be that the superior performance is due to some combination of these latter characteristics.

As noted above EI has been a popular construct in organizational settings and has been incorporated into many employee assessment and development programs. However, if EI is to be used as a valid assessment criterion for employment, promotion, or team qualification, it must be known whether it provides incremental variance above and beyond established personality traits and cognitive ability. Another limitation inherent in the current movement toward a team-based business model is the notion that team performance will necessarily outstrip that of competitive individuals or of the team member of highest competence (Allen & Hecht, 2004). While it may seem theoretically feasible, as yet this hypothesis has not been directly tested. I now turn to a discussion of the aims and hypotheses for this dissertation.

Aims and Hypotheses

The current study was designed to investigate the effects of EI on the ability of participants performing in pairs to use emotional cues to make judgments about whether instances of a series of animated characters were "Correct." A greater understanding of individual differences in learning in this paradigm might eventually contribute to procedures for selecting members of project teams or methods of choosing individuals for promotion.

Participants performed in one of three conditions: collaboration, competition, or control. In the collaboration condition, two participants performed in the context of working together to win a prestigious team project at work. In the competition condition, two participants performed

in the context of competing with each other to win a prestigious promotion at work. In the control condition, a single participant performed in the context of competing with an unseen rival for the prestigious promotion. Because a previous study (Fellner, 2006) demonstrated the ability of individual participants to use both positive and negative emotional cues to make judgments about similar animated characters, the critical cue designating whether stimuli in this study were "Correct" was restricted to a positive facial expression of emotion.

The study used a computer-based discrimination learning paradigm, which displayed 100 animated characters as stimuli. On each trial, participants indicated via mouse-click whether the animated character was Correct and received feedback about whether their decision was Right or Wrong. At intervals, they also received feedback about their Percent Right to date, and had the opportunity to discuss ideas and strategy (collaboration and competition conditions), or to record comments about their ideas (control condition).

It was expected that participant pairs with higher average EI would demonstrate learning more quickly than those with lower average EI, and that collaborators would perform better than competitors. Furthermore, it was believed that competitors might eschew contact with their participant partner or, alternatively, seek to mislead each other as to their success or strategy, negating any advantage of team performance. The control condition was used as a referent for individual performance, and it was thought that participants in the control condition would perform similarly to those in the competition condition

It was anticipated that cognitive ability would predict individual performance on this learning task, in both the competition and control conditions. Further, it was anticipated that EI would predict team performance, such that higher average EI among team members would predict higher team scores, especially in the collaboration condition. Finally, since feedback

regarding whether their judgment was Right was given on each trial, performance on the cognitive task was expected to improve from early to later blocks of trials for all groups, as they learned the proper discrimination. However, when controlling for personality and general intelligence, the success rate would increase more rapidly over blocks of trials for high-EI participant pairs than for low-EI participant pairs.

A secondary goal was to examine the relationships among EI, teamwork attitudes, and subjective response to task performance. According to Mayer and Salovey's (1997) four-branch hierarchy of EI, high-EI individuals can evaluate emotions and moods as to their situational appropriateness, and regulate positive and negative emotions so as to enhance intellectual and emotional achievement, thereby improving behavioral outcomes. Furthermore, Fellner et al. (2007) reported that high-EI individuals experienced less distress and worry during cognitive task performance. Consequently, it was believed that higher-EI teams would demonstrate lower distress and higher task engagement during performance of the discrimination learning task. Although it is more difficult to predict the relationship between EI and subjective response to task performance in the competitive context, EI should relate to the ability to regulate negative emotions and moods. Thus, higher EI should ameliorate the stress response as well as facilitate task engagement. Finally, EI should relate to teamwork attitude and team performance (i.e., collaboration). High-EI individuals, particularly those in the collaboration condition, should express better attitudes about teamwork and this good teamwork attitude should be related to enhanced performance on the discrimination learning task.

CHAPTER 2

METHOD

Participants

Participants were 311 students (188 women, 123 men; aged 18-50; $M = 19.8$; $SD = 2.97$) recruited from the introductory psychology research pool at the University of Cincinnati. All spoke English as their primary language, and had normal or corrected-to-normal vision. An additional 15 students (10 women, 5 men) participated in the experiment, but their data were excluded from analysis for various reasons (e.g., one participant of a pair was under age 18; instructions from a research assistant revealed the condition of the experiment; familiarity of a participant with the research assistant tainted performance during the experimental session). All participants received 2 research participation credits, which contributed to fulfillment of their course requirements. All participants were treated ethically according to standards of the American Psychological Association (APA, 2002).

Design

The experiment used a 3×10 mixed model design (participant condition $\times$ blocks of trials). Participant condition was the between-subjects factor with three levels: collaboration, competition, or control. Blocks of trials was the within-subjects factor consisting of 10 successive blocks of 10 trials each. The dependent variable was the number of wrong answers given in discriminating "correct" from "incorrect" stimuli.

Materials and Apparatus

Materials and apparatus consisted of a test battery administered prior to performance of a computer-based maximal performance discrimination learning task, followed by three post-task questionnaires for collaboration and competition participants, or two for control participants. The

experiment was conducted in a 12′×16′ room lighted by overhead fluorescent fixtures. Participants sat at an 8′×4′×29″ table on which the computer monitor and keyboard were situated. Participants in the collaboration and competition conditions sat next to each other; control participants were by themselves.

<div align="center">*Performance Task*</div>

Discrimination Learning Task

A discrimination learning task was presented using one to four personal computers (PCs), as needed for the number of participants scheduled. Computers were Dell PCs with Intel® Pentium® 4 central processing units and NVIDIA GeForce4 MX (or Intel® 82865G Graphics Controller, or 32MB ATI Rage 128 Ultra) display adapters. The monitors were Dell Model 992 19″ flat CRTs set at a resolution of 1024×768 pixels. Participants sat at a viewing distance of approximately 17″.

Stimuli consisted of a series of 100 animated characters that were created using virtual reality software (People Putty; Haptek, 2004). This software facilitates the creation of lifelike interactive 3-D characters, which can be used in standalone applications, or in developing personalized user interfaces for Internet websites. This software has been used in a variety of research and education applications. Old Dominion University's Center for Advanced Engineering Environments, in collaboration with NASA, led a multi-university consortium in developing a distance-learning system to teach concepts of aerospace engineering; the Division of Pediatric Informatics at Cincinnati Children's Hospital Medical Center used it to create interactive characters for a training application related to its bioinformatics operations; and the University of North Carolina at Charlotte used it to develop systems to augment traditional

methods of the treatment for social phobias, and enhance human-computer interactions (Haptek, 2008).

Stimuli for the current study were developed by manipulating the facial configurations (e.g., face shape, hair style, and eye color) of a number of People Putty's facial templates, yielding 25 different Caucasian male faces. Then, two emotions (happy and sad) were combined factorially with two hat heights (tall and short crown), to create four different emotion/hat-height combinations. Each character was imbued with each of these combinations, thereby yielding 100 characters with a positive or negative expression on his face, and wearing a hat with a tall or short crown. Examples of these stimuli are presented in Appendix A. Characters were limited to head-and-shoulders views of Caucasian males in order to minimize error variance that might have arisen from a more heterogeneous stimulus set.

The animated characters were displayed in a window 300×300 pixels in size in the center of the screen, and were invoked by calling the animation file via MatLab. Stimuli were displayed in a unique randomized order for each experimental session (i.e., collaboration and competition participant partners in the same experiment session received the same randomized order, but participant pairs and individuals in different sessions received different randomized orders; control participants each received a unique randomized order of stimuli).

The discrimination learning task involved deciding whether instances of these animated characters were "Correct." Notably, the stimuli were displayed for as long as the participant took to decide about status. The critical cue, designating whether a character was "Correct," was if the character had a positive expression (cf. stimulus [a] in Appendix A). Following presentation of each stimulus, participants responded by using the mouse to click Yes ("Correct") or No ("Incorrect"), and then received on-screen feedback about whether their answer was "Right" or

"Wrong." At intervals, participants also received feedback about their performance to date (i.e., cumulative percent right).

The three participant conditions differed in terms of how many participants performed the task at a time and the participation scenario given before the task (described in the *Procedure* section below). Data were collected using MatLab. Following the discrimination learning task, post-task measures were administered, as described below.

<center>*Trait Measures*</center>

Emotional Intelligence

Trait emotional intelligence (see Appendix B). The Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) consists of 30 items, which produce scores on three factors: Attention to Emotion, Emotional Clarity, and Emotion Repair. A 7-point rating scale is provided for participant response. High scores on these subscales have been related to low depression, high mood recovery, and goal orientation, and should relate to high performance-based scores on the discrimination learning task. This measure was administered prior to the learning task.

Emotional understanding (see Appendix C). The Situational Test of Emotional Understanding (STEU; MacCann & Roberts, 2008) is a reliable and valid test of emotional understanding consisting of 42 items which assess the ability to understand, analyze and use emotional knowledge about oneself and others. Questionnaire items present work-related, personal, and context-free situations. High scores on this test have related to academic achievement, Big Five agreeableness, and low anxiety and stress. This measure was administered prior to the learning task.

Emotion management (see Appendix D). The Situational Test of Emotion Management (STEM; MacCann & Roberts, 2008) is a reliable and valid test of emotion management

consisting of 30 items which assess the ability to regulate emotions in order to enhance intellectual and emotional accomplishments. Questionnaire items present work-related and personal situations. High scores on this test have related to academic achievement, reports of satisfaction with past life events, and low anxiety and stress. This measure was administered prior to the learning task.

General Intelligence

Letter Series (LS) and Esoteric Analogies (EA; see Appendices E and F). These two paper-and-pencil tests (Stankov, 2000) are tests of reasoning ability, used in internal research by the Educational Testing Service (ETS; Princeton, NJ). They have been supplied for use in this study by Dr. Richard D. Roberts, a senior research scientist at ETS. These measures were administered prior to the learning task.

Personality

The Big Five (see Appendix G). The 40-item Mini-Modular Markers (3M40; Saucier, 2003) assesses the Big Five personality traits as orthogonal dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. This is a new Big Five marker set that is shown to have markedly lower interscale correlation, with no loss of validity, relative to previous marker sets with a comparable number of items. This measure was administered prior to the learning task.

Teamwork

Attitudes about teamwork (see Appendix H). The Teamwork Assessment (Wang, Zhuang, Liu, MacCann, & Roberts, in press) consists of 30 items which assess three teamwork dimensions: Cooperation with Others, Advocating and Influence, and Negotiation. A 6-point scale is provided for participant response. In validation studies, these subscales related

moderately to personality, particularly Agreeableness and Openness to Experience. Additionally, they predicted academic performance, especially music. This scale was provided for use in this study by Dr. Richard D. Roberts, a senior research scientist at ETS. This measure was administered prior to the learning task.

<center>*State Measures*</center>

State Questionnaire.

The 96-item pre-task Dundee Stress State Questionnaire (DSSQ; Matthews et al., 1999; see Appendix I) assesses 11 dimensions of mood, motivation and cognition in performance settings. Scales are grouped into three clusters associated with task engagement (e.g., energy, task motivation), distress (e.g., tension, low confidence) and worry (e.g., self-esteem, task-related thoughts) symptoms. Task engagement, distress and worry are estimated as factor scores from the first-order scales, using regression equations derived from normative data collected by Matthews, Campbell, et al. (2002). Distributions of these scores approximate to standard scores. The post-task DSSQ (see Appendix J) assesses the same 11 dimensions of mood, motivation and cognition in performance settings as the pre-task DSSQ and also includes an embedded version of the NASA Task Load Index (NASA-TLX; Hart & Staveland, 1988), a standard measure of workload based on ratings of task demands and subjective reactions to the task that is widely used in human performance research.

Teamwork

Teamwork experience (see Appendix K). The Teamwork Survey (Offermann et al., 2004) consists of eight items which assess the degree to which respondents value the cohesion and effectiveness of the teamwork experience. A separate question on this questionnaire requests the

duration of prior acquaintance of participant partners (i.e., team demographics). This measure was administered following the learning task (collaboration and competition conditions only).

Personality

The Big Five (see Appendix L). The BFI-11 (Rammstedt & John, 2007) is a very short (11-item) version of the Big Five Inventory (BFI-44) which measures four of the Big Five personality dimensions (Neuroticism, Extraversion, Openness, Conscientiousness) with just 2 items, and Agreeableness with 3 items (Rammstedt & John recommend the addition of a third Agreeableness item in studies in which this construct is vital). Notably, the reliability and validity of the shortened form remain significant despite the reduction, and the instrument has been recommended for use in research situations that have limited time constraints. A separate section of this questionnaire asks for the degree of helpfulness of the participant's partner, and personal demographics (i.e., participant gender and race). This questionnaire was completed by collaboration and competition participants, and was used as a measure of the participant's impression of his or her partner's personality following completion of the learning task.

Procedure

Two or four students were recruited for each experiment session depending on how many experimenters were scheduled to conduct the experiment at a given time. When all expected students had arrived they were randomly assigned to one of three participant conditions (collaboration, competition, or control) and accompanied an experimenter to one of two lab spaces. In the collaboration and competition conditions, two participants worked in the same room; in the control condition participants worked individually.

Participants first read and signed an informed consent statement. They then completed a battery of questionnaires assessing trait EI, Big Five personality traits, attitudes regarding

teamwork, and pre-task subjective state (pre-DSSQ). Next, they completed two situational judgment tests, one of emotional understanding (STEU) and one of emotion management (STEM), and two short tests of general cognitive ability (Letter Series and Esoteric Analogies). Each of these questionnaires and tests is described in detail in the *Materials and Apparatus* section.

Participants then completed a computer-based discrimination learning task which involved deciding whether animated characters shown on the monitor were "Correct." The critical cue designating correctness was a positive facial expression. Participants viewed each character until they had decided about its status and then responded to an on-screen question, "Correct?" by mouse-clicking Yes (Correct) or No (Incorrect). After each trial, participants received on-screen feedback as to whether their answer was "Right" or "Wrong." After each block of 10 trials they also received feedback about their Percent Right since beginning the task (e.g., "You now have 60% Right"). This task consisted of making a judgment about a total of 100 characters.

The three participant conditions differed in two ways. First, the number of participants performing in an experiment session was different. In the collaboration and competition conditions, two participants worked concurrently in the same room, though at separate PCs. In the control condition, participants worked individually at a PC.

The second difference in participant conditions was in the participation scenario given before the task. In the collaboration condition, participants were told to imagine being on a work team with each other, and although they were working individually on the computer task, their overall goal was to maximize their team score because, as a team, they were trying to win the opportunity to work on an important and high-profile project. They were told that they would

receive feedback on their performance, and at intervals would also get the opportunity to tell each other how they were doing, and suggest strategy. They were reminded that the team with the highest score would win the prestigious project, so they should strive to maximize their team score.

In the competition condition, participants were told to imagine they were competing with each other for an important and high-profile promotion at work. They were told they would work individually on the computer task with the goal of maximizing their own score because, as competitors, only one of them would get promoted. They were told that they would receive feedback on their performance, and at intervals would also get the opportunity to tell each other how they were doing, and suggest strategy. They were reminded that the individual with the highest score would win the prestigious promotion, so their goal was to maximize their own score.

In the control condition, participants were told to imagine they were competing for an important and high-profile promotion at work, so their goal was to maximize their score on the computer task because only the individual with the highest score would get promoted. They were told that they would receive feedback on their performance, and at intervals would also receive a recap of their Percent Right, which they should record on their Feedback Form (see Appendix M) along with any comments they had regarding strategy. They were reminded that the individual with the highest score would win the prestigious promotion, so they should strive to maximize their own score.

After receiving these condition-specific participation scenarios, participants were given instructions explaining the mechanics of the computer task (i.e., decide whether the character is Correct, click Yes or No, evaluate trial and interim feedback) and an opportunity to ask

clarifying questions. When these had been answered, they began the task. At the interim

feedback junctures, participants wrote their Percent Right on their Feedback Forms (Appendix

M) and were given 30 seconds to discuss (collaboration and competition conditions) or record

(control condition) ideas and strategy.

After the discrimination learning task, all participants completed the post-task state

questionnaire (post-DSSQ). In addition, participants in the collaboration and competition

conditions completed brief surveys of teamwork attitude and team demographics; and Big Five

personality traits of their participation partner plus personal demographics. Participants in the

control condition completed a very brief questionnaire regarding team and personal

demographics. After completing these post-task measures, participants were thanked for their

participation and dismissed. Duration of the experiment sessions ranged from 90-120 min.

CHAPTER 3

RESULTS

Measures for Analysis

The following data were entered into an SPSS database for each participant: (1) participant number, experimental condition and session number, age, gender, and individual and team demographics; (2) questionnaire data for the trait EI, self-report personality, and teamwork assessment measures, the pre-task DSSQ, the post-task DSSQ, the post-task teamwork survey, and the other-report personality measure; (3) answers for the STEU and STEM-30; and (4) codes for correct and incorrect responses, plus confidence ratings, for the items on the LS and EA tests. Means and standard deviations for all these measures are presented in Table 1. Additionally, the number of correct responses made in the practice trials, and 10 blocks of main trials of the discrimination learning task were entered. Means and standard deviations of all these data are presented in Table 2.

Table 1.

Means and standard deviations for all questionnaire measures for the overall sample

Measure	N	Mean	SD
Dispositional Variables			
General Intelligence			
Letter Series[1] Correct	311	9.65	2.14
Esoteric Analogies[1] Correct	311	12.96	2.95
Emotional Intelligence			
TMMS[2]			
Attention to Emotion	311	68.61	10.23
Clarity of Emotion	311	54.04	9.21
Emotion Repair	311	31.47	5.20
STEU[3]	311	0.61	0.10
STEM-30[4]	308	0.53	0.09

Table 1 *(continued).*

Means and standard deviations for all questionnaire measures for the overall sample

Measure	N	Mean	SD
Self-report Personality: 3M40[5]			
Extraversion	311	48.00	11.40
Agreeableness	311	58.06	8.74
Conscientiousness	311	52.63	8.98
Neuroticism	311	34.31	9.97
Openness	311	52.90	8.61
Teamwork Assessment[6]			
Cooperation	311	56.13	8.09
Advocacy	311	36.33	6.34
Negotiation	311	40.41	4.93
Total	311	132.87	16.23
State Variables			
Other-report Personality: BFI-11[7]			
Extraversion	241	6.14	1.63
Agreeableness	241	11.18	2.04
Conscientiousness	241	7.68	1.44
Neuroticism	241	4.17	1.41
Openness	241	6.45	1.17
Teamwork Survey Items[8]			
Satisfaction	241	10.34	2.90
Effectiveness	241	10.77	2.91
Cohesion	241	7.11	2.03
Total	241	28.22	7.59
Subjective State			
Pre-task DSSQ[9]			
Worry (*z*-scores)	311	0.38	0.99
Task Engagement (*z*-scores)	311	0.17	0.85
Distress (*z*-scores)	311	-0.47	0.85
Post-task DSSQ			
Worry (*z*-scores)	311	-0.32	0.95
Task Engagement (*z*-scores)	311	0.76	0.88
Distress (*z*-scores)	311	-0.06	0.95

[1] Letter Series, Esoteric Analogies (Stankov, 2000); [2] Trait Meta-Mood Scale (Salovey et al., 1995); [3] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [4] Situational Test of Emotion Management (MacCann & Roberts, 2008); [5] 3M40 (Saucier, 2003); [6] Teamwork Assessment (Wang, Zhuang, Liu, MacCann, & Roberts, in press); [7] Big Five Inventory (Rammstedt & John, 2007); [8] Teamwork Survey (Offermann et al., 2004); [9] Dundee Stress State Questionnaire (Matthews et al., 1999)

Table 2.

Means and standard deviations for all blocks of discrimination learning task for overall sample

Measure	N	Mean	SD
Discrimination Learning Task			
Block 1 Correct	191	6.42	1.92
Block 2 Correct	191	7.77	2.04
Block 3 Correct	191	8.21	2.09
Block 4 Correct	191	8.31	2.29
Block 5 Correct	191	8.67	1.98
Block 6 Correct	191	8.79	1.86
Block 7 Correct	191	8.87	2.01
Block 8 Correct	191	8.95	1.89
Block 9 Correct	191	9.02	1.87
Block 10 Correct	191	9.07	1.77
Blocks Total	191	84.07	16.27

Effects of Experimental Factors on Learning

Before testing performance data for the discrimination learning task, data for participant partners in the collaboration and competition conditions were aggregated to obtain mean performance scores for participant pairs (i.e., a team score). In addition, it should be noted that by crossing experimental conditions with gender, three gender categories were created (i.e., female-only teams, male-only teams, and mixed-gender teams).

Learning Effects

Learning Effects by Teamwork Condition

The mean numbers of correct responses in each block of trials for the collaboration, competition, and control conditions are presented in Figure 1. Before testing for effects of the experimental conditions on learning in the main blocks of trials, a one-way between-subjects ANOVA was conducted on mean performance scores in the practice blocks. There was not a significant difference between the collaboration, competition and control groups in the practice session ($p > .05$), indicating that all participants started the main trials on equal footing.

To test for effects of the experimental conditions on learning, a 3 (conditions; collaboration, competition, control) × 10 (blocks of trials) mixed-model ANOVA was conducted with repeated measures on blocks of trials. There was a significant main effect for blocks of trials, $F(5.29, 994.19)$[1] $= 89.09$, $p <$ .001, indicating that significantly more correct identifications were made in block 10 than in block 1. There was also a significant main effect for condition, $F(2, 188) = 9.70$, $p < .001$, indicating that collaborating and competing pairs made more correct identifications than control participants throughout all blocks. There was no interaction between blocks of trials and condition, indicating that learning rates were similar in each condition.
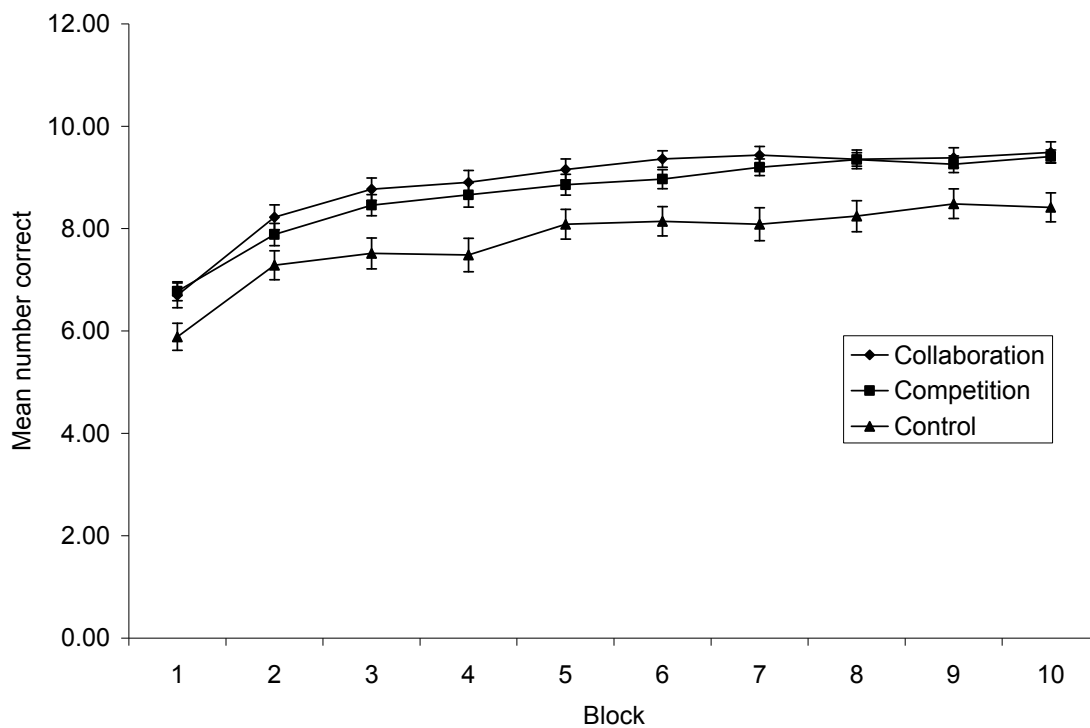
Figure 1. Mean number of correct responses for the collaboration, competition and control conditions as a function of trials. Error bars represent standard errors.

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[1]   Box-corrected *df* are reported in this and subsequent repeated measures analyses to compensate for violations of the sphericity assumption (Maxwell & Delaney, 2004).

Learning Effects by Gender

The mean numbers of correct responses in each block of trials for the female-only, male-only, and mixed-gender teams are presented in Figure 2. To test for the effects of team gender composition on learning a 3 (gender; female-only, male-only, mixed-gender) × 10 (blocks of trials) mixed-model ANOVA was conducted. Once again, the main effect for trials was significant, $F(5.31, 999.08) = 71.88$, $p < .001$. However, the main effect for gender was non-significant, $F(2, 188) = 2.66$, $p > .05$. Additionally, the interaction between gender and blocks of trials was non-significant, $F(10.63, 999.08) = .512$, $p > .05$. These results indicate that female-only teams, male-only teams, and mixed-gender teams learned at similar rates on this task. The null finding for gender differences in this learning task mirrors Fellner's (2006) finding, and thus was unsurprising. Based on this finding, gender differences will not be discussed further in this analysis.
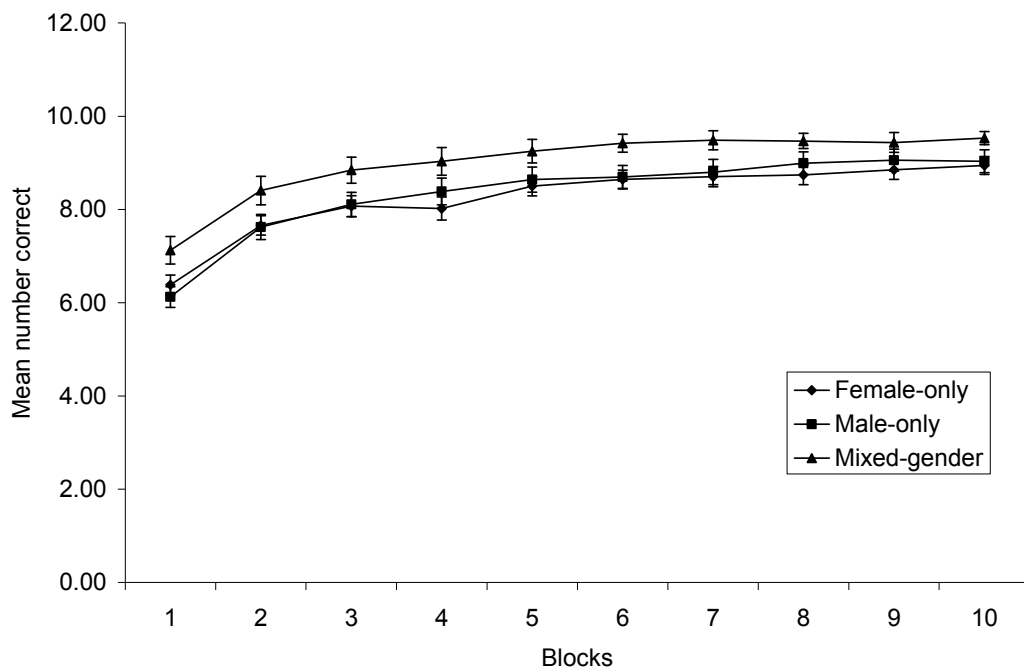
Figure 2. Mean number of correct responses for female-only, male-only and mixed-gender teams as a function of blocks of trials. Error bars represent standard errors.

Effects of Teamwork Condition on Subjective States

Mean differences in participants' subjective states (post-task state – pre-task state) are displayed for each condition in Figure 3. To test the effects of experimental condition on DSSQ subjective states, a series of 2 (time; pre-task, post-task) × 3 (condition) mixed-model ANOVAs was conducted for the distress, task engagement and worry scales. Main effects of time showed that participants were significantly more distressed, $F(1, 308.00) = 61.72$, $p < .001$, but also more engaged, $F(1, 308.00) = 111.56$, $p < .001$, and less worried, $F(1, 308.00) = 207.84$, $p < .001$, following the discrimination learning task. There were significant interactions for time with distress, $F(2, 308.00) = 5.68$, $p < .01$, and task engagement, $F(2, 308.00) = 4.21$, $p < .05$. Control participants experienced a significantly greater increase in distress and a significantly lesser increase in task engagement than participants in the collaboration and competition conditions. The mean differences between the collaboration and competition groups were non-significant. There was not a significant interaction for worry.
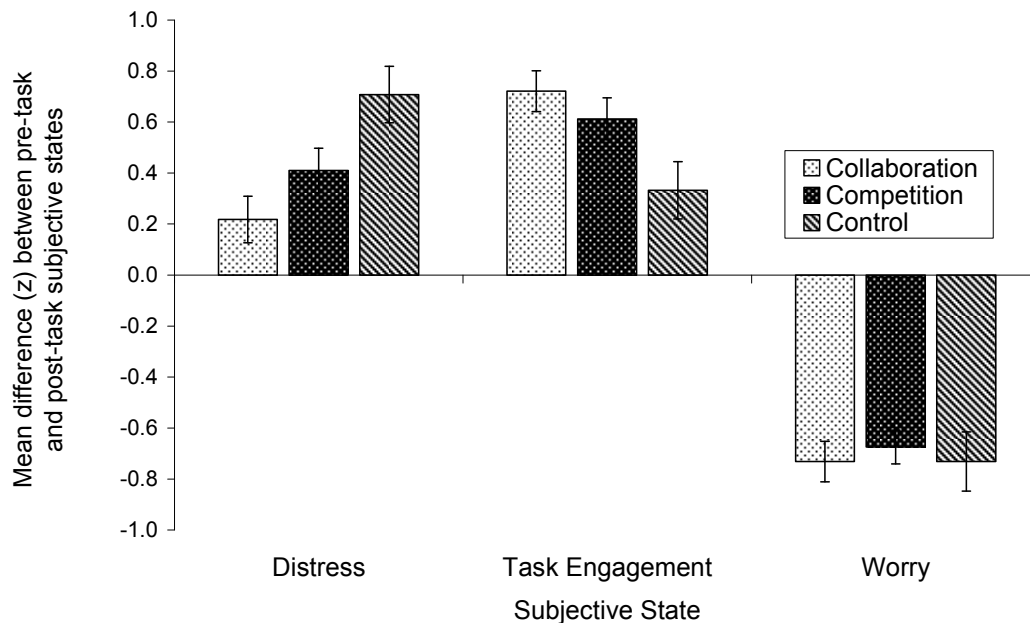
Figure 3. Mean differences in distress, task engagement, and worry for participants in the collaboration, competition, and control conditions. Error bars represent standard errors.

Effects of Teamwork Condition on Teamwork Experience

Mean total and subscale scores for the Teamwork Survey Items for the collaboration and competition conditions are displayed graphically in Figure 4. To test the effects of condition on TSI teamwork experience independent sample Bonferroni-corrected (Agresti & Finlay, 1997) *t*-tests were conducted for the collaboration and competition conditions on the TSI total and subscale scores. Results indicate that collaboration participants reported more satisfaction with the experience, $t(239) = 3.98$, $p = .001$; felt it was more effective, $t(239) = 4.85$, $p < .001$; and felt higher levels of cohesion, $t(239) = 5.29$, $p = .001$, than participant pairs in the competition condition, thus leading to a significantly better overall teamwork experience, $t(239) = 4.80$, $p < .001$, during the discrimination learning task than did those in the competition condition.
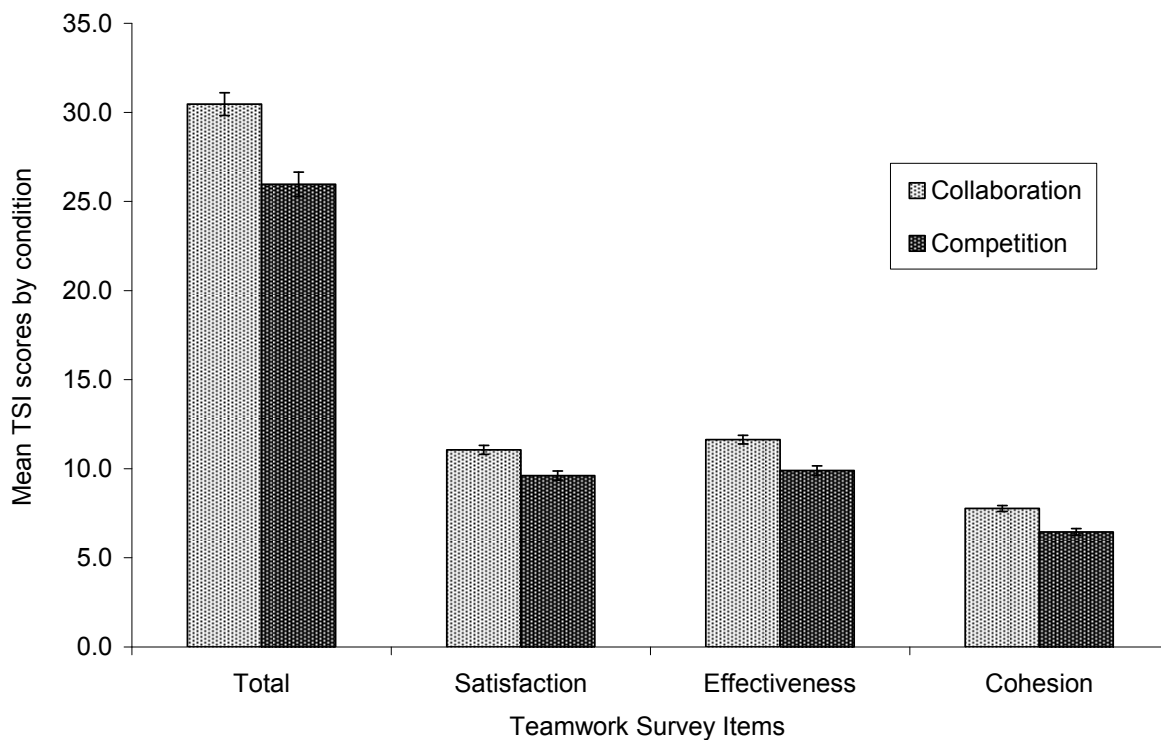
Figure 4. Mean total and subscale scores for the Teamwork Survey Items for the collaboration and competition conditions. Error bars represent standard errors.

Associations among Dispositional Measures

This section presents correlations between the various sets of stable disposition measures, including general intelligence, trait and ability EI, the Big Five personality traits, and stable attitudes towards teamwork. In addition, the opportunity is taken to present dispositional correlates of two sets of situational measures: perceptions of teamwork (teamwork experience) and perceptions of the other team member's personality.

Correlations among Intelligence Measures

General intelligence and EI. Correlations between general intelligence measures and EI measures for the overall sample are presented in Table 3, where it can be seen that the trait and ability EI measures were differentially associated with the Letter Series and Esoteric Analogies tests. Correlations between these measures for the collaboration, competition, and control conditions are presented in Table N-1 in Appendix N. Trait EI was not associated with general intelligence at the overall level (Table 3), or in any of the conditions (Table N-1). Conversely, the STEU and STEM-30 were associated with both general intelligence measures at the overall level, and most strongly with the Letter Series test (Table 3).

Trait EI vs. ability EI. Correlations between trait and ability EI measures for the overall sample are presented in Table 4. Correlations between these measures for the collaboration, competition, and control conditions are presented in Table O-1 in Appendix O. A detailed look at these associations shows that the TMMS emotion repair scale was significantly positively related to overall STEU and STEM-30 total scores (Table 4).

Table 3.

Correlations between general intelligence and EI for the overall sample

	General Intelligence Measures	
	Letter Series[1]	Esoteric Analogies[1]
	Overall Sample (*N*=311)	
Trait Emotional Intelligence		
TMMS[2]		
Attention to Emotion	0.028	0.019
Clarity of Emotion	-0.010	-0.031
Emotion Repair	0.074	0.015
Ability Emotional Intelligence		
STEU[3]	0.287***	0.261***
STEM-30[4] (*N*=308)	0.259***	0.159**

[1] Letter Series, Esoteric Analogies (Stankov, 2000); [2] Trait Meta-Mood Scale (Salovey et al., 1995);
[3] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [4] Situational Test of Emotion Management (MacCann & Roberts, 2008)

***p* < .01; ****p* < .001

Table 4.

Correlations between trait and ability EI measures for overall sample

	Ability EI Measures	
	STEU[1]	STEM-30[2]
Trait EI Scales		
	Overall Sample	
	(*N*=311)	(*N*=308)
TMMS[3]		
Attention to Emotion	0.053	0.135*
Clarity of Emotion	0.055	0.039
Emotion Repair	0.179**	0.154**

[1] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [2] Situational Test of Emotion Management (MacCann & Roberts, 2008); [3] Trait Meta-Mood Scale (Salovey et al., 1995)

**p* < .05; ***p* < .01

Correlations among Personality Measures

Big Five personality traits and teamwork attitude. Correlations between self- and other-reported personality traits and teamwork attitude and experience for the overall sample are presented in Table 5. The pattern of associations between the personality and teamwork measures is interesting. In the overall sample, self-reported personality traits correlated robustly with teamwork attitude, while other-reported personality correlated robustly with teamwork experience. In both cases the associations were strong and in the expected directions (i.e., positively with extraversion, agreeableness, conscientiousness and openness; negatively with neuroticism). This pattern makes sense because the 3M40 and TWA are self-report instruments of stable traits and attitudes, whereas the BFI-11 and TSI are situation-dependent state measures whose scores arose directly from the experience participants had with their partners.

Table 5.

Correlations between self- and other-reported personality traits and teamwork attitude and experience for the overall sample

	Teamwork Attitude[1]	Teamwork Experience[2]
	Overall Sample	
3M40[3] (*N*=311)		
Extraversion	0.339***	0.036
Agreeableness	0.502***	0.263***
Conscientiousness	0.381***	0.207**
Neuroticism	-0.168**	-0.086
Openness to Experience	0.416***	0.175**
BFI-11[4] (*N*=241)		
Extraversion	0.048	0.307***
Agreeableness	0.211**	0.483***
Conscientiousness	0.181**	0.447***
Neuroticism	-0.144*	-0.334***
Openness to Experience	0.017	0.143*

[1] Teamwork Assessment (Wang, Zhuang, Liu, MacCann, & Roberts, in press); [2] Teamwork Survey Items (Offermann et al., 2004); [3] 3M40 (Saucier, 2003); [4] Big Five Inventory (Rammstedt & John, 2007)

p < .05; **p* < .01; ***p* < .001

With respect to 3M40 and teamwork experience, significant positive associations were found with agreeableness, conscientiousness and openness; and for BFI-11 and teamwork attitude, positive associations were found with agreeableness and conscientiousness and a negative association was found with neuroticism. These less robust findings may be due to method variance.

Correlations between Intelligence and Personality

Intelligence, personality, and teamwork. Correlations between intelligence, personality and teamwork scales are presented in Table 6. General intelligence was largely unassociated with self-reported personality traits, except for a negative correlation between 3M40 agreeableness and the Esoteric Analogies test. With respect to EI, all three TMMS subscales were intercorrelated with 3M40 personality traits in most cases. The TMMS related most strongly to agreeableness, especially for the attention and repair subscales. The clarity subscale had its highest associations with conscientiousness (a positive correlation) and neuroticism (a negative correlation). These relationships are consistent with expectations considering that the basis of the TMMS is trait EI, which overlaps with various elements of personality. The STEU was not associated with self-reported personality, and the STEM-30 had only two significant though weak correlations, with agreeableness and neuroticism. These weak and non-significant relationships are also unsurprising since the STEU and STEM-30 are based on the ability model of EI. The STEM-30's association with agreeableness is particularly understandable because managing the situations in the STEM-30 entail resolving them agreeably. Its positive association with neuroticism may reflect heightened attention to emotional stimuli.

Intelligence and teamwork. General intelligence was significantly negatively associated with teamwork attitude in the overall sample (Table 6). With respect to EI, all three TMMS

subscales were positively associated with dispositional teamwork attitude in the overall sample. The STEU was unassociated, and the STEM-30 was weakly, though significantly associated with teamwork attitude at the overall level. For situational teamwork experience, the only significant association was for TMMS repair.

Correlates of Performance

Correlations between general intelligence, EI, personality, and the teamwork measures with performance on the discrimination learning task for the overall sample are presented in Table 7. Note that, due to the teamwork nature of this study, the performance scores of participant partners were aggregated to obtain a mean team score. Consequently, the dispositional variables were aggregated as well so that meaningful analyses could be performed (Jordan & Troth, 2004).

Dispositional measures. Performance on the learning task was not associated with general intelligence. It was also not associated with EI; all but two of the associations were negative and none exceeded ±.10 in magnitude. Performance on the learning task was not associated with self-reported personality, but did show some associations with team workers' reports of their partners' personality at the overall level. These associations do not necessarily indicate an effect of perceptions of the partner on performance; appraisal of performance may have influenced impressions of the other person. Teamwork attitudes did not predict performance on the learning task. In fact most correlations were negative and did not exceed ±.05. Teamwork experience showed a positive association with performance in block 10 in the overall sample. As with perceptions of personality, no conclusions can be drawn about the causal relationship between teamwork experience and performance.

Table 6.

Correlations between general and emotional intelligence scales and self-reported personality traits, and teamwork attitude and experience for the overall sample

| | General Intelligence | | Emotional Intelligence | | | | |
| | | | TMMS[1] | | | | |
	LS[2]	EA[2]	Attention	Clarity	Repair	STEU[3]	STEM-30[4]
3M40: self-report[5] (*N*=311)							
Extraversion	-0.046	-0.082	0.183**	0.248***	0.168**	-0.010	0.002
Agreeableness	-0.015	-0.194**	0.471***	0.266***	0.391***	0.100	0.117*
Conscientiousness	-0.020	-0.108	0.130*	0.325***	0.313***	0.017	0.092
Neuroticism	0.047	0.039	0.079	-0.305***	-0.255***	-0.031	0.122*
Openness to Experience	-0.002	0.068	0.237***	0.230***	0.156**	0.057	0.002
Teamwork Attitude[6]	-0.060	-0.116*	0.303***	0.319***	0.367***	0.034	0.124*
Teamwork Experience[7]	0.114	-0.036	0.089	0.115	0.278***	-0.025	0.089

[1] Trait Meta-Mood Scale (Salovey et al., 1995); [2] Letter Series, Esoteric Analogies (Stankov, 2000); [3] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [4] Situational Test of Emotion Management (MacCann & Roberts, 2008); [5] 3M40 (Saucier, 2003); [6] Teamwork Assessment (Wang et al., in press); [7] Teamwork Survey Items (Offermann et al., 2004)

*p < .05; **p < .01; ***p < .001

Table 7.

Correlations between general intelligence, EI, personality, and teamwork with block 1 and block 10 correct on the discrimination learning task for the overall sample

	Block 1 Correct	Block 10 Correct
General Intelligence[1]		
Letter Series (*N*=191)	-0.015	0.012
Esoteric Analogies (*N*=191)	0.028	0.067
Emotional Intelligence		
TMMS[2] (*N*=191)		
Attention to Emotion	-0.042	-0.089
Clarity of Emotion	0.047	-0.003
Emotion Repair	-0.029	-0.008
STEU[3] (*N*=191)	-0.097	0.069
STEM-30[4] (*N*=190)	-0.039	-0.068
Big Five Personality Traits		
3M40[5] (*N*=191)		
Extraversion (E)	0.008	-0.037
Agreeableness (A)	-0.056	-0.058
Conscientiousness (C)	0.060	0.009
Neuroticism (N)	-0.105	0.049
Openness (O)	-0.072	0.141
BFI-11[6] (*N*=121)		
Extraversion (E)	0.044	0.117
Agreeableness (A)	-0.027	0.183*
Conscientiousness (C)	-0.085	0.201*
Neuroticism (N)	0.034	-0.183*
Openness (O)	-0.029	0.116
Teamwork		
Teamwork Attitude[7] (*N*=191)	-0.048	-0.022
Teamwork Experience[8] (*N*=121)	-0.071	0.195*

[1] Letter Series, Esoteric Analogies (Stankov, 2000); [2] Trait Meta-Mood Scale (Salovey et al., 1995); [3] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [4] Situational Test of Emotion Management (MacCann & Roberts, 2008); [5] 3M40 (Saucier, 2003); [6] Big Five Inventory (Rammstedt & John, 2007); [7] Teamwork Assessment (Wang, Zhuang, Liu, MacCann, & Roberts, in press); [8] Teamwork Survey (Offermann et al., 2004)

*p < .05

Subjective state measures. Correlations between post-task DSSQ subjective states and the number of correct answers in block 1 and block 10 of the discrimination learning task are presented in Table 8 for the overall sample and the collaboration, competition and control conditions. A number of significant associations were found between performance and DSSQ

post-task subjective states. In block 1, the number of correct answers was significantly correlated with low distress in the overall sample and in the competition and control conditions. By block 10, the magnitude of this negative correlation intensified in all but the competition condition, where it remained about the same. For task engagement in the overall sample, a significant correlation emerged by block 10. This result was due primarily to the positive correlations between task engagement and performance for competition pairs and control participants. Correlation magnitudes were generally fairly similar across the different conditions. Performance was not associated with post-task worry.

Table 8.

Correlations between post-task DSSQ [1] subjective states and block 1 and block 10 correct on the discrimination learning task

DSSQ Subjective States	Block 1 Correct	Block 10 Correct
	Overall Sample	
	N=191	
Worry	-0.138	-0.046
Engagement	0.096	0.232**
Distress	-0.256***	-0.400***
	Collaboration Condition	
	N=61	
Worry	-0.177	-0.111
Engagement	-0.015	0.100
Distress	-0.179	-0.362**
	Competition Condition	
	N=60	
Worry	0.044	-0.094
Engagement	0.262*	0.265*
Distress	-0.294*	-0.279*
	Control Condition	
	N=70	
Worry	-0.210	-0.047
Engagement	0.067	0.240*
Distress	-0.251*	-0.419***

[1] Dundee Stress State Questionnaire (Matthews et al., 1999)
*p < .05; **p < .01; ***p < .001

To further evaluate the relationships between learning and subjective states, partial correlations were calculated between subjective states and block 10 performance, controlling for block 1 performance (Table 9). A significant partial correlation would suggest that state related to learning, relative to initial performance. In the overall sample, high engagement and low distress related to the number of correct answers in block 10 when controlling for block 1 performance. The magnitude of association between engagement and block 10 correct was similar to the overall sample in the competition and control conditions, but failed to reach significance, likely due to the smaller sample size. The association between distress was also found in the collaboration and control conditions and approached significance in the competition condition ($.10 > p > .05$). Worry was unrelated to block 10 performance when controlling for block 1 performance.

Correlates of Subjective State Measures

Intelligence and subjective states. Correlations between general intelligence, EI and pre-task and post-task subjective states are presented in Table 10. Correlations for these measures by condition are presented in Table P-1 in Appendix P. General intelligence was unrelated to DSSQ subjective states at pre-task in the overall sample (Table 10) and all the conditions except for worry (Table P-1), which showed a negative association with the Letter Series test in the control condition. At post-task, in the overall sample (Table 10), a significant positive correlation emerged for task engagement and the Letter Series test, and a significant negative correlation emerged for worry and the Esoteric Analogies test. These correlations were driven by like associations in the control condition (Table P-1).

Table 9.

Partial correlations between DSSQ[1] post-task subjective states and block 10 correct answers, controlling for block 1 correct

Post-task Subjective State	Block 10 Correct
Overall Sample (*N*=188)	
Worry	-0.005
Engagement	0.214**
Distress	-0.350***
Collaboration Condition (*N*=58)	
Worry	-0.075
Engagement	0.106
Distress	-0.336**
Competition Condition (*N*=57)	
Worry	-0.109
Engagement	0.213
Distress	-0.221
Control Condition (*N*=67)	
Worry	0.014
Engagement	0.231
Distress	-0.375**

[1] Dundee Stress State Questionnaire (Matthews et al., 1999)
**$p < .01$; ***$p < .001$

Table 10.

Correlations between general and emotional intelligence and subjective states measured before and after the discrimination learning task for the overall sample

	DSSQ[1] Subjective State					
	Pre-task			Post-task		
	Worry	Engage	Distress	Worry	Engage	Distress
	Overall Sample (*N*=311)					
General Intelligence[2]						
Letter Series	-0.065	0.052	-0.087	0.028	0.159**	-0.009
Esoteric Analogies	-0.070	-0.039	-0.074	-0.132*	0.072	-0.060
Emotional Intelligence						
TMMS[3]						
Attention to Emotion	0.106	0.053	-0.210***	-0.031	0.097	-0.099
Clarity of Emotion	-0.178**	0.301***	-0.383***	-0.204***	0.142*	-0.263***
Emotion Repair	-0.172**	0.230***	-0.386***	-0.120*	0.118*	-0.167**
STEU[4]	-0.237***	0.111	-0.189**	-0.105	0.112*	-0.104
STEM-30[5] (*N*=308)	-0.123*	0.198***	-0.082	-0.051	0.176**	-0.020

[1] Dundee Stress State Questionnaire (Matthews et al., 1999) [2] Letter Series, Esoteric Analogies (Stankov, 2000); [3] Trait Meta-Mood Scale (Salovey et al., 1995); [4] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [5] Situational Test of Emotion Management (MacCann & Roberts, 2008).

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

With respect to EI in the overall sample (Table 10), DSSQ pre-task worry was negatively related to all EI scales except TMMS attention to emotion. At post-task, the negative association between worry and clarity increased in magnitude. Pre-task engagement was positively correlated with all of the EI measures except TMMS attention to emotion and the STEU. At post-task, engagement was attenuated for TMMS clarity and repair, and the STEM-30. Pre-task distress was significantly negatively correlated with all of the EI measures except the STEM-30. At post-task these correlations were all attenuated, though with clarity and repair they remained significant. There was some variation in correlation magnitudes across the different task conditions (Table P-1). The TMMS appeared to be most predictive of subjective state in the collaboration condition, and least in the competition condition. By contrast, the STEU and STEM-30 related most strongly to subjective state in the competition condition, and least in the control condition. However, patterns of association were qualitatively similar within each condition, and variations in correlation magnitudes may be attributable to chance.

Self-reported personality and subjective states. Correlations between personality and subjective response to the discrimination learning task for the overall sample are presented in Table 11. DSSQ pre-task worry associated positively with 3M40 neuroticism, though by post-task it had diminished slightly. Pre-task engagement and distress were significantly associated in the expected directions with all 3M40 traits. For engagement, the positive associations with extraversion, agreeableness, conscientiousness and openness, and the negative association with neuroticism in the overall sample were all attenuated in the post-task data, and the only remaining significant correlation was with agreeableness. For distress, the negative associations with extraversion, agreeableness, conscientiousness and openness increased in magnitude, and the positive association with neuroticism was attenuated by post-task. The pattern of associations observed at the overall level was generally the same by

condition (see Table Q-1). Worry and engagement were particularly predictive of personality in the collaboration condition, while distress predicted personality in both the collaboration and competition conditions.

Table 11.

Correlations between self-reported personality and subjective states measured before and after the discrimination learning task for overall sample

	DSSQ[1] Subjective State					
	Pre-task			Post-task		
	Worry	Engage	Distress	Worry	Engage	Distress
	Overall Sample					
3M40[2] (*N*=311)						
Extraversion (E)	-0.108	0.112*	-0.362***	-0.097	-0.004	-0.143*
Agreeableness (A)	0.013	0.204***	-0.227***	-0.038	0.160**	-0.221***
Conscientiousness (C)	-0.070	0.227***	-0.218***	-0.070	0.050	-0.164**
Neuroticism (N)	0.313***	-0.178**	0.354***	0.210***	0.030	0.170**
Openness (O)	0.056	0.155**	-0.249***	-0.014	0.100	-0.168**

[1] Dundee Stress State Questionnaire (Matthews et al., 1999); [2] 3M40 (Saucier, 2003)
p < .05; **p* < .01; ***p* < .001

Other-reported personality and subjective states. DSSQ worry was unrelated to BFI-11 traits at pre-task or post-task except for a negative association with extraversion at post-task (Table 12). Task engagement at pre-task was associated positively with agreeableness and conscientiousness, and negatively with neuroticism for the overall sample. The associations with agreeableness and conscientiousness gained magnitude, and with neuroticism lost magnitude, by post-task. Distress for the overall sample was associated negatively with BFI-11 agreeableness and conscientiousness, and positively with neuroticism at pre-task. At post-task the negative associations with agreeableness and conscientiousness were magnified, and negative associations with extraversion and openness emerged as well. The positive association with neuroticism fell to non-significance. These data suggest either that distressed mood may lead to more negative assessments of others' personality, or that the perceived personality of others impacts one's mood. This pattern of associations was also observed by condition, particularly in the collaboration condition (see Table R-1).

Table 12.

Correlations between other-reported personality and subjective states measured before and after the discrimination learning task for overall sample

	DSSQ[1] Subjective State					
	Pre-task			Post-task		
	Worry	Engage	Distress	Worry	Engage	Distress
	Overall Sample					
BFI-11[2] (*N*=241)						
Extraversion (E)	-0.030	0.097	-0.064	-0.134*	0.124	-0.159*
Agreeableness (A)	0.079	0.181**	-0.177**	0.012	0.243***	-0.195**
Conscientiousness (C)	-0.007	0.131*	-0.141*	-0.090	0.200**	-0.185**
Neuroticism (N)	-0.022	-0.281***	0.144*	0.044	-0.219**	0.121
Openness (O)	0.089	-0.066	-0.121	-0.063	0.104	-0.134*

[1] Dundee Stress State Questionnaire (Matthews et al., 1999); [2] Big Five Inventory (Rammstedt & John, 2007)
*p < .05; **p < .01; ***p < .001

Multiple Regressions for Dispositional Variables and Subjective States

Bivariate correlations show that both Big Five personality and EI variables correlated with post-task subjective states, which raises the question of whether EI is predictive over and above personality in a teamwork context. Accordingly, hierarchical multiple regressions were run as follows for post-DSSQ task engagement, distress, and worry to see if EI had additional predictive validity. Dummy variables were used to code the three experimental conditions. Predictors were entered into the equation in three steps as follows: (1) pre-task subjective state (i.e., task engagement, distress, or worry), and the two dummy variables to control for initial subjective state and experimental condition; (2) dispositional variables (i.e., Big Five personality traits and conventional intelligence); (3) EI variables (i.e., TMMS subscales, STEU, STEM-30). A summary of multiple regression results is presented in Table 13. There was no additional effect for EI over and above dispositional variables. However, inspection of regression coefficients showed that for distress, the beta for clarity was significant, β = -.122, p = .05, indicating that clarity is an aspect of EI that predicts less distress, with other predictors controlled. There was no effect of teamwork condition. However, 3M40 neuroticism and the letter series test were predictive for task engagement,

p = .028, and *p* = .037, respectively. In general, these regressions suggest that, while personality and EI may be predictive of initial, pre-task subjective state, these variables are not strongly related to changes in subjective state induced by the experience of performing the task.

Table 13.

Multiple regressions for DSSQ[1] post-task subjective states controlling for pre-task state and experimental condition

Step	Variables	R^2	ΔR^2	*df* Change
Task Engagement				
1	Control variables	0.218	0.218***	3, 304
2	Dispositional variables	0.271	0.053**	7, 297
3	EI variables	0.273	0.002	5, 292
Distress				
1	Control variables	0.197	0.197***	3, 304
2	Dispositional variables	0.222	0.025	7, 297
3	EI variables	0.239	0.017	5, 292
Worry				
1	Control variables	0.392	0.392***	3, 304
2	Dispositional variables	0.413	0.021	7, 297
3	EI variables	0.426	0.013	5, 292

[1] Dundee Stress State Questionnaire (Matthews et al., 1999)
**$p < .01$; ***$p < .001$

Multiple Regression for Dispositional Variables and Teamwork Experience

Bivariate correlations indicated that personality was related to teamwork attitude for all participants and to teamwork experience for experimental participants. In addition, EI was related to personality for all participants. Consequently, in order to see if teamwork attitude had any additional predictive validity over and above personality and EI, a hierarchical multiple regression was run as follows for teamwork experience. Dummy variables were used to code the three experimental conditions. Predictors were entered into the equation in three steps as follows: (1) dispositional variables (i.e., Big Five personality traits and conventional

intelligence) and the two dummy variables to control for experimental condition; (2) EI

variables (i.e., TMMS subscales, STEU, STEM-30); and (3) teamwork attitude (i.e., TWA).

A summary of multiple regression results is presented in Table 14. There was no additional

effect for teamwork attitude over and above dispositional and EI variables. However,

inspection of regression coefficients showed significant betas for TMMS repair, $\beta = .169$,

$p = .007$, agreeableness, $\beta = .162$, $p = .028$, and the Letter Series test, $\beta = .119$. $p = .036$,

indicating that emotion repair, Big Five agreeableness, and general intelligence are

dispositional variables that predict more satisfactory teamwork experience.

Table 14.

Multiple regressions for TSI[1] teamwork experience controlling for dispositional variables and EI and experimental condition

Step	Variables	R^2	ΔR^2	df Change
1	Dispositional variables	0.351	0.351***	9, 229
2	EI variables	0.386	0.030*	5, 224
3	Teamwork attitude	0.389	0.003	1, 223

[1] Teamwork Survey Items (Offermann et al., 2004)
*$p < .05$; ***$p < .001$

CHAPTER 4

DISCUSSION

The principal objective for this study was to investigate whether EI related to the ability of individuals and teams to use an emotional cue in making judgments about animated characters in the context of collaboration vs. competition in an employment situation. It was predicted that high-EI teams, particularly those under collaborative instructions, would learn faster to identify characters designated as "correct," than low-EI competitive teams and individuals. This principal prediction of the study was disconfirmed in that EI did not predict the rate of learning. However, performance was associated with experimental condition and subjective state. Learning was faster for participant pairs in both teamwork conditions. Additionally, higher task engagement was associated with faster learning particularly for competing pairs and control participants, as was lower distress for all participants.

A secondary aim for the study was to explore the relationship among general intelligence, EI, teamwork attitudes and experience, and subjective response to task performance. It was predicted that high-EI teams and individuals would be more engaged, and less distressed and worried following this potentially stressful task. Additionally, they would express better attitudes about, and experience of, teamwork. Results showed that the task tended to elicit both distress and task engagement, but it tended to be less stressful for participants in the teamwork conditions. The various EI scales were modestly related to subjective stress, but only the mood repair scale of the TMMS was associated with teamwork experience.

Effects of Task Condition on Performance

Predictions regarding performance on the discrimination learning task were partially supported. The prediction that teams and participants in all conditions would improve from early to later blocks was supported, demonstrating that they did, indeed, learn the proper

discrimination that made the stimuli "correct." This is consistent with results of other discrimination learning tasks such as the weather prediction task (cf. Gluck, Shohamy, & Myers, 2002) in which individuals must predict binary outcomes (e.g., sun or rain) from arbitrary cues such as geometric patterns. Gluck et al. found that, over 200 trials, participants significantly improved their predictions from near-chance levels in the first block of 50 trials to over 70% correct in the fourth block. More importantly, the present results are consistent with the outcome of a previous study (Fellner, 2006) in which participants judged whether animated characters were designated as terrorists or not. The current study provides further evidence for implicit learning of the importance of *emotional* cues in this kind of task. Furthermore, learning takes place even in the absence of the context provided by Fellner's (2006) instruction to discriminate terrorists from non-terrorists.

The predictions that participant pairs in the collaboration condition would perform better than those in the competition condition, and that competition pairs would perform similarly to control participants, were not supported. In fact, the collaboration and competition participant pairs performed about the same, and at higher levels than the control participants throughout. This effect was evident in the first block of trials, with there being a consistent performance advantage for the team conditions in subsequent blocks. Generally, this result may suggest a motivating effect of team participation, an interpretation supported also by the elevation of task engagement in both team conditions. More specifically, this finding might be due to team monitoring, which entails maintaining a comprehensive understanding of one's teammates' activities during task performance (Marks & Panzer, 2004). According to Marks and Panzer, team monitoring serves as a team regulation function by ensuring that team member behaviors remain task-oriented and goal-focused. They tested the effects of team monitoring, coordination and intra-team feedback on performance of a three-hour computer-based helicopter flight simulation using three-person teams with

members in the roles of pilot, gunner and radar specialist. Working together effectively was imperative for successful execution of this highly interdependent task. They found that monitoring fellow team members' activities improved their coordination and feedback, which in turn enhanced team performance. It seems likely that these same processes, particularly the provision of feedback, influenced the results in the current study. Even though task instructions to participant pairs in the competition condition set individual participants at odds with each other for winning a prestigious job, the act of sharing progress information was the same *behavior* that collaboration pairs exhibited. This intra-team feedback during performance afforded individuals the opportunity to adjust their behaviors (i.e., their responses regarding whether animated characters were "correct"), thus improving their performance in a manner, and to a degree, that was similar to participant pairs in the collaboration condition.

Associations among Dispositional Measures

The differential associations between the general intelligence (i.e., the LS and EA) and EI measures used in this study are consistent with Mayer and Salovey's (1997) conceptualization of EI. Consequently, it is unsurprising that the STEU and STEM-30 (ability EI) showed strong correlations with general intelligence, and especially with verbal ability, and low-magnitude correlations with the TMMS (trait EI) subscales. This divergence of EI measures based on different theoretical underpinnings is a common difficulty in the assessment of EI (Matthews, Zeidner, et al., 2002). Indeed, in developing the STEU and STEM-30, MacCann and Roberts (2008) investigated the degree to which different response formats yielded associations with vocabulary. They found that when the STEM-30 was presented with a multiple choice response requirement it correlated much more highly with vocabulary than when it was presented in a rate-the-extent format (i.e., 5-point rating scale; 1 = *strongly disagree* to 5 = *strongly agree*).

Big Five personality traits, as measured by the 3M40, were also associated with enduring attitudes about teamwork, as assessed by the TWA. Past research shows mixed results regarding personality and team processes, such as social cohesion, flexibility, communication, and workload sharing, which are similar to the TWA subscales: Cooperation with Others, Advocating and Influence, and Negotiation. Some studies have found links between personality and these team processes. In a correlational study of 51 teams drawn from four different manufacturing organizations, Barrick, Stewart, Neubert, and Mount (1998) found a number of meaningful associations between personality and attitudes about teamwork. They found that agreeableness, conscientiousness and emotional stability (a positively-valenced term for neuroticism) were positively related to mean levels of self-report scores regarding the team processes, social cohesion and flexibility; extraversion and emotional stability were positively related to communication; and agreeableness and emotional stability were positively related to workload sharing. Additionally, agreeableness, extraversion and emotional stability were negatively correlated with team conflict. Conversely, other researchers have failed to find an association between teamwork attitude and personality. Barry and Stewart (1997) studied the role of personality in group processes using a sample of graduate students performing creative problem-solving tasks during a period of several weeks. They found no association between personality and the team processes, open communication and group cohesion. Findings from the current study are similar to Barrick et al.'s in that virtually all the items on the TWA relate conceptually to the team processes investigated in that study.

The small negative correlation between general intelligence (esoteric analogies) and teamwork attitude suggests that participants with higher cognitive ability might be less willing to share their knowledge in a teamwork situation, perhaps because of their concern that other team members might try to obtain a free ride (Marwell & Ames, 1979). Again,

previous work reveals mixed findings. LePine (2003) investigated team adaptation and post-change performance in a university sample using a three-hour computer-based decision-making simulation task. Cognitive ability was assessed using the Wonderlic Personnel Test (WPT, Form IV; Wonderlic & Associates, 1983), and adaptability was assessed by independent raters who evaluated simulation transcripts for the teams' role structure adaptation (i.e., their communication patterns after an unexpected change during the simulation). LePine found that cognitive ability was positively related to role structure adaptation, which is comprised of teamwork behaviors that correspond conceptually to items on the TWA. Another study, however, failed to show this link. Barrick et al. (1998) measured general mental ability (GMA) using the WPT Form 5 (Wonderlic & Associates, 1983), and found a negative correlation between GMA and flexibility, another behavior corresponding to items on the TWA. Results of the current study are similar to Barrick et al.'s in that, on average, more intelligent participant pairs and individuals disagreed with statements related to beneficial teamwork attitudes.

The positive associations between the TMMS subscales and TWA teamwork attitude confirm the predictions made for the current study. Previous research regarding EI and teamwork focuses on team performance rather than teamwork attitudes per se, and while there is a large and growing literature on the former, the latter is difficult to locate. The current study seems to be the first to directly investigate this association. Nonetheless, the current findings are consistent with Goleman's (1998) claim that EI can facilitate situations and relationships in organizational settings. They are also consistent with the findings reported above regarding teamwork attitudes and Big Five personality traits, with which the TMMS shows strong associations.

Effects of Subjective States on Performance

The tests for conditional effects on DSSQ mean differences in post-task—pre-task subjective states of the participants revealed an interesting pattern for distress and engagement. For participants in both teamwork conditions, distress was attenuated and task engagement accentuated, in comparison with participants in the control condition. This finding is consistent with the transactional model of subjective response to task performance (Matthews, 2000). According to Matthews, cognitions regarding task and environmental demands largely determine subjective response to a particular task. If a task is appraised as mentally demanding, it provokes distress; if it is viewed as challenging, it elicits task engagement; and if it is perceived as evaluating the self and one's personal goals, it evokes worry. According to this taxonomy, the pattern of subjective response to the current task suggests that it was somewhat mentally demanding, particularly for control participants; it was challenging, particularly for teamwork participants; but none of the participants viewed it as a reflection on themselves or of their own personal goals.

While the learning task was similar to one Fellner (2006) used in an earlier study, the current results only partially resemble her earlier findings. In that study the task showed a decline in task engagement, suggesting that, in comparison with the earlier task, the current one was more challenging, perhaps reflecting the change in task demands. In the earlier task, participants were asked to determine the terrorist status of animated characters based on a positive-, negative- or non-emotive cue. In the current task, while a positive emotion constituted the discriminating cue, participants were asked only whether the animated characters were "correct," while providing no context in which to make the determination. It might be that the context of terrorist identification provided enough of a clue to the emotional nature of the discrimination cue, that the earlier task was rendered less challenging. Another possibility is that in the current study, the particularly pronounced increase in task

engagement in the teamwork conditions might reflect the additional challenge of negotiating the teamwork relationship with participant partners. Further investigation is required to determine which of these two alternatives is more accurate.

Correlates of Performance

Dispositional Measures

The general lack of association between the dispositional measures and performance of the discrimination learning task was unexpected. Predictions that general cognitive ability, EI, and personality would predict performance, especially in the collaboration condition, were not supported. However, this and other studies (e.g., Fellner, 2006) have demonstrated that it is difficult to predict performance on discrimination learning tasks from conventional individual difference factors like general intelligence, EI, and personality.

The lack of influence of general intelligence might be due to implicit rather than explicit learning of the cue. Implicit learning has repeatedly been found to be unassociated with IQ, both in different populations (e.g., young adults with and without mental retardation; cf. Atwell, Conners, & Merrill, 2003), and in the same population performing both implicit and explicit learning tasks (e.g., college students performing artificial grammar learning and series-completion problem solving tasks; cf. Reber, Walkenfeld, & Hernstadt, 1991). However, the current study was not explicitly designed to differentiate implicit and explicit learning processes.

In relation to EI, it may be relevant that the current task was not overtly a facial emotion identification task, but one that required participants to use emotion-related information to make decisions about the animated characters. In speculating about similar findings obtained previously, Fellner (2006) suggested that methodological factors, such as artificiality of the task or low statistical power may have led to null findings, or that it could relate to the inadequacy of self-report scales to reliably measure abilities that should be

assessed with maximal performance tests. However, that limitation was taken into consideration in designing the current study. Included here were two new ability-model EI measures based on the situational judgment test paradigm, the STEU and STEM-30. These are objectively-scored maximal performance tests of emotional understanding and emotion management, whose answers can be scored objectively. However, they also failed to predict performance on the learning task. The current study adds further credence to the argument that this simply is not a type of task which can demonstrate that high EI is a key to superior emotion perception (Mayer & Salovey, 1997), attaining more beneficial life outcomes (Schutte et al., 1998), or adapting to social demands (Goleman, 1995). Given that learning to respond appropriately to emotional cues seems an important real-life facet of emotional competence, these findings suggest some limitations on the ability of current EI tests to predict emotional criteria.

Finally, with personality, it should be remembered that two different measures were used, the 3M40 as a self-report of stable personality traits, and the BFI-11 as an other-report of the participant partners' personality based on interpersonal interactions during task performance in the collaboration and competition conditions. With respect to self-reported personality, the current null findings might be explained in light of Klein and Lee's (2006) findings which showed conscientiousness to be related to learning through a mediating variable. They tested 157 students in an international business studies course, and controlled for cognitive ability as measured by the Wonderlic Form 1 (Wonderlic Personnel Test Inc., 1992) and scores on a first midterm exam. They found that while scores on a second midterm exam showed no direct association with Big Five personality traits, there was an indirect association between conscientiousness and learning through the mediator variable of goal-setting. The current study did not consider the possible role of mediators, but it is possible that such a relationship might exist. With respect to other-reported personality, the three

significant associations with block 10 correct could be interpreted as an effect of successful task performance on perceptions of the participant partner as having personality traits desirable in the teamwork setting. In particular, they indicate that high performing teams tended to view each other as agreeable, conscientious and emotionally stable (i.e., low on the neuroticism scale).

Teamwork Measures

As with personality, two teamwork scales were used: the TWA, a self-report dispositional measure of attitudes about teamwork; and the TSI, a state measure of the teamwork experience for collaboration and competition pairs. The failure of the TWA to predict performance on the learning task might be due to the contrived nature of the task. Other teamwork research (e.g., Jordan & Troth, 2004; Offermann et al., 2004) has revolved around longer-term tasks and projects, some lasting for entire 15-week semesters, and requiring much more integrated teamworking activities (e.g., a blizzard survival task, group class projects, etc.). In those studies, participants had much more time to become acquainted with one another and negotiate the group dynamics that necessarily accompany team membership and performance issues. The positive association between the TSI and Block 10 Correct again suggest an effect of successful task performance on participants' enjoyment of the teamwork experience (i.e., doing well led to a report of a good teamwork experience), although other causal hypotheses cannot be excluded.

Subjective State Measures

Unlike the dispositional measures used in this study, two of the DSSQ post-task subjective state subscales were predictive of block 10 performance. At the overall level, these findings are comparable to those of a previous study (Fellner, 2006). Correlation magnitudes are similar in different conditions so it appears that the states are generally related to performance on the learning task irrespective of whether a person works on a team. The

strong association with engagement may relate to this state factor's association with high attentional resource availability, demonstrated in a variety of studies (Matthews, Davies, & Lees, 1990; Matthews, Davies, Westerman, & Stammers, 2000). Additionally, the negative correlations between performance and distress may relate to findings that stress has been shown to disrupt a variety of tasks such as number vigilance and letter cancellation tasks for regular smokers after forced abstinence of smoking (Parrott, Garnham, Wesnes, & Pincock, 1996), playing golf games for elite golfers (Hassmén, Raglin, & Lundqvist, 2004), and a vigilance task incorporating knowledge of results (KR) in a number of different conditions (e.g., KR for hits, KR for misses, composite KR; Szalma, Hancock, Dember, & Warm, 2006). Those studies generally showed that higher stress was associated with degraded performance, while the current study presents a reverse finding of that phenomenon, suggesting that the task in the current study was an easy one.

The partial correlations which controlled for Block 1 performance further support the above analysis regarding these associations. Significant partial correlations between states and performance suggest that states related to learning, relative to Block 1 performance. Where associations were significant at Block 1, the Block 10 associations were generally, though not dramatically, attenuated. Additionally, while the correlations between Block 10 performance and engagement for the competition and control conditions did not remain significant, they were comparable and stronger in magnitude, respectively, with those in the overall sample. Thus, states may influence learning irrespective of whether the task is performed in a team or solo context. It is also possible that appraisals of successful performance influence subjective state, although the evidence discussed in the previous paragraph is consistent with a causal effect of states on performance.

Correlates of Subjective States

Intelligence and Subjective States

Similar to the finding for performance and engagement, the link between general intelligence and engagement might be due to the greater availability of attentional resources associated with both factors (Matthews et al., 1990; Matthews et al., 2000). The associations between the EI scales and subjective states are somewhat more complex. With respect to the robust findings for TMMS clarity and repair, strong associations found in the overall sample seem to be driven largely by those in the collaboration condition and the control condition. It may be that the mood-regulation abilities assessed by the TMMS are especially helpful in these conditions. The attenuation of correlations between the TMMS and DSSQ in the competition condition suggests that mood-regulation is less important in this context. However, this conclusion is tentative given that differences in correlations across task conditions may reflect chance.

With respect to the ability EI measures, according to the Mayer and Salovey (1997) conceptualization, the STEU and STEM-30 should be associated with perception and expression of emotion, use of emotion to facilitate thought, and regulation of emotion. Furthermore, while Mayer and Salovey assert that scores should correlate with other cognitive abilities, they say nothing of how ability EI might predict subjective states resulting from performance of cognitive tasks. The current study is the first to use ability EI measures in this type of analysis. Even so, MacCann and Roberts (2008) report negative associations for the STEU and STEM-30 with DASS anxiety and stress (Lovibond & Lovibond, 1995). These associations are analogous to the negative correlations at pre-task with DSSQ worry and distress in the current investigation. Since the STEU and STEM-30 are new measures, the nature of these relationships must be studied further so that a clearer picture of their true nature can be discerned. Since the STEU and STEM-30 are considered to be dispositional

measures, it might be expected that such relationships with state measures would be inconsistent. However, it is conceptually plausible that individuals with the EI abilities captured by the STEU and STEM-30 should be less susceptible to the state changes induced by tasks such as the current study entailed.

Personality and Subjective States

The associations among Big Five personality traits and subjective states were analyzed with respect to self-reported personality traits for participants in all conditions, and other-reported perceptions of personality for participant pairs in the collaboration and competition conditions. I will first discuss self-reported personality (i.e., 3M40 correlations), followed by other-reported personality (i.e., BFI-11 correlations).

Self-reported personality and subjective states

Of the Big Five, neuroticism showed the most robust pattern of associations with DSSQ subjective states, correlating in the expected directions with all three subjective states at pre-task (i.e., higher worry and distress, lower task engagement). Neuroticism has been identified as a marker for stress-proneness (Matthews, Deary, & Whiteman, 2003), with high neuroticism individuals being more easily upset by everyday hassles (Vollrath, 2000), and experiencing more difficulties when interacting with others (Berry, Willingham, & Thayer, 2000). Although correlations were attenuated during task performance, neuroticism remained associated with higher worry and distress at post-task.

The association pattern for extraversion differed from expectations. Extraversion has been related to better mental health in a variety of studies (Bienvenu et al., 2001), perhaps because high extraversion individuals are more likely to use effective coping strategies (Penley & Tomaka, 2002), thus buffering the stress brought on by hectic or demanding situations. It may also be that high extraversion generally affords better emotional adjustment regardless of life circumstances (Matthews et al., 2003). Given these expectations, it was

surprising that the negative correlation between extraversion and distress was attenuated during task performance, indicating increased distress at post-task. However, when considered in conjunction with the findings for neuroticism, this trend supports the assertion that the task was an easy one.

Big Five agreeableness is characterized largely by social attributes such as cooperation, dependability and kindness (Matthews et al., 2003). It has also been associated with high quality social interactions in everyday life (Asendorpf, 1998), as well as in laboratory investigations (Berry & Sherman Hansen, 2000). Furthermore, in business settings, individuals high in agreeableness generally work better in teamwork situations (Neuman & Wright, 1999), although Graziano, Hair and Finch (1997) assert that lack of competitiveness may be a detriment for them. These attributes of agreeableness were borne out in the current experiment; although the associations were attenuated during task performance, participants high on agreeableness remained engaged and unstressed.

For conscientiousness, the pattern of associations is as would be expected for a tedious task, with conscientiousness being related to high task engagement at pre-task and diminishing to non-significance by post-task (Matthews, Campbell, et al., 2002). In addition, although the magnitude of negative correlation with distress at pre-task diminishes by post-task, it remained significant, indicating that participants were still generally unstressed. These findings are consistent with Fellner's earlier (2006) results using a similar task.

Big Five openness has been identified as a predictor of vocational interests (Costa, McCrae, & Holland, 1984), as well as intellect and aesthetic reactivity (Costa & McCrae, 1992a). Furthermore, Vollrath (2000) found it to be correlated only weakly with daily hassles in a three-year longitudinal study of university students. In the current study, the attenuation of the correlation between openness and task engagement seems to indicate that the task was unchallenging and perhaps boring. Furthermore, although the negative association with

distress was also attenuated, the post-task correlation indicates that participants were still unstressed. Indeed, observations of the participants during the experimental sessions showed that when they had identified the critical cue, participants generally navigated through the rest of the task as quickly as possible.

Other-reported personality and subjective states

Associations between DSSQ subjective states and BFI-11 reports of participant partner personality suggest that participants' views of their partners might have been influenced by their own subjective response to the discrimination learning task. In general, if a participant experienced higher engagement and lower distress, s/he viewed her or his partner's personality in a favorable manner. For task engagement, significant associations indicate that participants high on engagement viewed their partners as agreeable, conscientious, and emotionally stable (i.e., "un-neurotic"). For distress, significant associations suggest that unstressed participants viewed their partners as extraverted, agreeable, conscientious, and open to experience. Additionally, at post-task, correlations indicate that low worry was associated with participants' judgment of their partners as being extraverted. It should be noted that caution is needed with respect to drawing conclusions about causation from these associations. It is also possible that perceptions of the other's personality influenced subjective state; working with an agreeable, conscientious, emotionally stable might have helped to maintain task engagement, for example.

Multiple regressions for dispositional variables and subjective states

While EI and personality each yielded associations with post-task subjective states, the multiple regressions showed that EI did not add incremental predictive power over and above the Big Five. These null findings were surprising in light of previous studies, which clearly demonstrated the incremental predictive power of various EI scales (cf. Fellner, 2006; Fellner, Pérez, Emo, & Matthews, 2005). In general, it appeared that EI, along with

personality traits, related to pre-task state, and these individual differences in subjective state persisted in attenuated form throughout the task. EI may relate more to initial state than to individual differences in response to the task, despite expectations that EI would relate to more enjoyable team interactions. It may be that a clearer picture of the nature of the effects of EI would be elucidated via path analysis. Future researchers should consider this method in designing subsequent studies.

Multiple regression for dispositional variables and teamwork experience

Although personality and EI, particularly of the trait model, showed fairly robust associations with teamwork attitude and experience, the multiple regression showed incremental predictive power for teamwork experience only for agreeableness and repair. For personality, this is consistent with Barrick et al.'s (1998) findings that agreeableness was positively associated with self-report scores concerning team processes, social cohesion and flexibility. For EI, it supports Goleman's (1998) assertion that EI can be beneficial in organizational settings.

On the other hand, except for a weak negative correlation between the esoteric analogies test and teamwork attitude, general intelligence was not associated with teamwork attitude or teamwork experience at the bivariate level. Consequently, the fact that letter series test scores provided incremental predictive power for teamwork experience was surprising and suggests that some moderator variable masked this association at the bivariate level. Future research could use path analysis to identify the specific structure of these relationships.

Limitations

There were a number of limitations to this study, which became apparent during the course of its conduct, and generally relating to the possibility, suspected fairly early, that the discrimination learning task might not be as difficult as had been expected. In retrospect, I

think about what parameters I could have manipulated to make the task more challenging. Certainly, the magnitude of the animated characters' positive and negative affect could have been attenuated so that participants' judgments about them required deeper-level processing and finer-tuned discrimination.

Another facet that I believe could have strengthened this study is incorporating an additional experimental condition, the emotive valence of the animated characters. Based on earlier findings (Fellner, 2006) that participants learned at similar levels in positive-emotive and negative-emotive conditions, it was decided to use only a positive-emotive condition in the current experiment. While this strategy reduced the number of participants required to complete the protocol, there remain unanswered questions as to why the task was so easy. For instance, the difficulty of the task in the previous study may have arisen from the challenge of assigning a negative attribute (i.e., "terrorist") to positively-valenced individuals (i.e., characters with a smile). In the current experiment, the participants simply had to judge that the happy character was "correct," a much more conceptually compatible task given the cultural imperative in the U.S. that being happy is the correct way to be.

Finally, results of this experiment might have been affected by the extent to which the task setting was representative of real-life occupational and team performance settings. The university participant pool drew individuals from a number of different academic majors. In an occupational setting in which applicants are vying for a particular job, or competing for a particular promotion, the demands of the position (i.e., the KSAOs) would necessarily make the applicant pool much more homogeneous. Additionally, in team performance situations, whereby co-workers are expected to pool their skills and efforts, those individuals generally have a longer history of work and acquaintance with one another than was afforded in the current experiment. Future research could explore these issues in actual employment settings.

Applications

In spite of the above-mentioned limitations, this study has generated some ideas for future research and also implies some useful applications for personnel selection and assigning existing personnel to teams. The strong associations between trait EI and teamwork attitude imply that individuals high in EI might approach an employment situation or a promotion opportunity readier and more willing to lend their effort to team projects in a teamwork environment. Consequently, it would be a good idea to include measures such as the TMMS and TWA in the battery of tests used to evaluate new hires or promotion candidates.

Another interesting group of associations, those between other-reported personality and teamwork experience, beg an answer to the question of the direction of the causal arrow between the two measures. Does a favorable opinion of others lead to enhanced teamwork experience? Or does a favorable teamwork experience influence workers' opinion of their teammates? This issue could be investigated by conducting a time series study using the TSI and BFI-11 in a work setting. Researchers would first have employees rate others in their work unit as a baseline for comparison. They would then assign workers to teams, allow these teams to work on their projects for a time, and then administer the TSI and/or BFI-11. This procedure could be carried through multiple phases to see if reports of teamwork experience and other-evaluations change over time, or to see if different combinations of individuals yielded different results with respect to these measures, as well as performance, productivity, profitability, and other business metrics. This paradigm could also be used to find out how workers are affected by changing different work-related parameters (i.e., more work, shorter deadlines, etc.).

The intercorrelations between personality, EI and teamwork attitudes and experience offer personnel managers (human resource professionals) a further opportunity to discover

the true nature of the individuals they are considering for hire or promotion. Experienced (i.e., jaded or untruthful) test-takers might answer direct questions regarding teamwork attitudes in a manner they believe will "look good on paper." Adding or substituting measures of personality and EI can offer an additional component to the battery of selection tools, thus enabling human resource managers to be more confident in their personnel selection and promotion decisions.

Another valuable application would be to use the instruments from this study, particularly the 3M40, TMMS, STEU, STEM-30, and TWA, in personnel selection. Admittedly, a further consideration is the manner in which they should be used. Specifically, Matthews, Zeidner, & Roberts (2007) point out that selection methods might entail a "multiple hurdles" approach, or that these data might be used in a regression model. The multiple hurdles approach involves using a variety of tests with cut-offs at different junctures (Wallace & Schwab, 1976). If the applicant does not make the cut-off, s/he is eliminated from the running for the position or promotion. The better strategy would be to enter the data into a regression model so that the degree to which each facet of an individual's profile might benefit a specific position or work group can be quantified, thus greatly enhancing the process of personnel selection.

Finally, the practical utility of EI in teamwork settings has been lauded by a number of industrial and organizational psychologists. Jordan and Troth (2004), having clearly demonstrated that emotions are essential to conflict resolution, and that they play a direct role in team performance, assert that further investigation should be pursued. They advise that this particular aspect of organizational behavior should be investigated by managers attempting to obtain gains in performance. Ashkanasy and Daus (2005) assert that organizational behavior research will profit from EI research for quite some time, but stress that the Mayer and Salovey (1997) ability model of EI should be the conceptualization from which researchers

work, while also recognizing that self-report questionnaires based upon the Mayer and Salovey model can be informative in certain situations, such as the Jordan and Troth (2004) and Offermann et al. (2004) studies (Daus & Ashkanasy, 2005). Offermann et al. (2004) suggested that emotional competencies are particularly important in interdependent and interactive task situations when effective teamwork is essential for successful overall performance. Included should be a holistic assessment of individual abilities, including cognitive and emotional skills. This method will afford the best explanation of performance in organizational settings.

In conclusion, I believe that results from the current study will be welcomed by these authors because they address personnel and teamwork issues up front, in advance of potential human resource decisions. They show that EI can be a valuable predictor of beneficial teamwork attitude, which is presumably one of the prerequisites for beneficial team behavior. I believe they will recognize and appreciate the implication that I have identified a method for creating a team, a priori, with better potential for excellent team performance. Consequently, the long term and longitudinal EI and teamwork research they suggest be initiated within organizations could yield even more powerful results.

REFERENCES

Adams, J. B., Adams, J., Rice, R. W., & Instone, D. (1985). Effects of perceived group effectiveness and group role on attributions of group performance. *Journal of Applied Social Psychology, 15*, 387-398.

Agresti, A., & Finlay, B. (1997). *Statistical methods for the social sciences* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

Allen, N. J., & Hecht, T. D. (2004). The 'romance of teams': Toward an understanding of its psychological underpinnings and implications. *Journal of Occupational and Organizational Psychology, 77*, 439-461.

American Psychological Association [APA]. (2002). *Ethical principles of psychologists and code of conduct.* Retrieved February 3, 2008, from http://www.apa.org/ethics/code2002.html

Archer, D. (2004). The myths of teamworking. *IEE Engineering Management, 14*, 16-18.

Aronson, E. (1969). Some antecedents of interpersonal attraction. In W. J. Arnold & D. Levine (Eds.), *Nebraska Symposium on Motivation: Vol. 17.* (pp. 143-171). Lincoln: University Nebraska Press.

Arrow, H., McGrath, J. E., & Berdahl, J. L. (2000). *Small groups as complex systems: Formation, coordination, development, and adaptation.* Thousand Oaks, CA: Sage.

Asendorpf, J. B., & Wilpers, S. (1998). Personality effects on social relationships. *Journal of Personality and Social Psychology, 74*, 1531-1544.

Ashkanasy, N. M. (2002). Studies of cognition and emotion in organizations: Attribution, affective events, emotional intelligence and perception of emotion. *Australian Journal of Management, 27*, 11-20.

Ashkanasy, N. M. (Ed.). (2004). Emotions and performance [Special issue]. *Human Performance, 17*(2).

Ashkanasy, N. M., Härtel, C. E. J., & Zerbe, W. J. (Eds.). (2000). *Emotions in the workplace: Theory, research, and practice,* Westport, CT: Quorum.

Ashkanasy, N. M., Zerbe, W. J., & Härtel, C. E. J. (Eds.). (2002). *Managing emotions in the workplace.* Armonk, NY: M. E. Sharpe.

Atwell, J. A., Conners, F. A., & Merrill, E. C. (2003). Implicit and explicit learning in young adults with mental retardation. *American Journal on Mental Retardation, 108*, 56-68.

Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia scale. I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research, 38*, 23-32.

Bagby, R. M., Taylor, G. J., & Parker, J. D. A. (1994). The twenty-item Toronto Alexithymia scale. II. Convergent, discriminant and concurrent validity. *Journal of Psychosomatic Research, 38*, 33-40.

Baker, D. P., & Salas, E. (1992). Principles for measuring teamwork skills, *Human Factors, 34*, 469-475.

Bales, R. F. (1950). *Interaction process analysis: A method for the study of small groups.* Cambridge, MA: Addison-Wesley Press.

Bandura, A. (1986). *Social foundations of thought and action.* Englewood Cliffs, NJ: Prentice-Hall.

Bar-On, R. (1997). *The Emotional Quotient Inventory (EQ-i): Technical Manual.* Toronto: Multi-Health Systems.

Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998). Relating member ability and personality to work-team processes and team effectiveness. *Journal of Applied Psychology, 83*, 377-391.

Barry, B., & Stewart, G. L. (1997). Composition, process, and performance in self-managed groups: The role of personality. *Journal of Applied Psychology, 82*, 62-78.

Beal, D. J., Cohen, R. R., Burke, M. J., & McLendon, C. L. (2003). Cohesion and performance in groups: A meta-analytic clarification of construct relations. *Journal of Applied Psychology, 88*, 989-1004.

Beck, A. T., & Steer, R. A. (1987). *Beck Depression Inventory manual.* San Antonio, TX: The Psychological Corporation.

Berry, D. S., & Sherman Hansen, J. (2000). Personality, nonverbal behavior, and interaction quality in female dyads. *Personality and Social Psychology Bulletin, 26*, 278-292.

Berry, D. S., Willingham, J. K., & Thayer, C. A. (2000). Affect and personality as predictors of conflict and closeness in young adults' friendships. *Journal of Research in Personality, 34*, 84-107.

Berry, J. W. (1967). Independence and conformity in subsistence-level societies. *Journal of Personality and Social Psychology, 7*, 415-418.

Bienvenu, O. J., Brown, C., Samuels, J. F., Liang, K-Y., Costa, P. T., Eaton, W. W., et al. (2001). Normal personality traits and comorbidity among phobic, panic and major depressive disorders. *Psychiatry Research, 102*, 73-85.

Borman, W. C., Hanson, M. A., Oppler, S. H., Pulakos, E. D., & White, L. A. (1993). Role of early supervisory experience in supervisor performance. *Journal of Applied Psychology, 78*, 443-449.

Boyatzis, R. E., & Goleman, D. (2002). *The Emotional Competency Inventory.* Boston: The Hay Group.

Brackett, M. A., & Mayer, J. D. (2003). Convergent, discriminant, and incremental validity of competing measures of emotional intelligence. *Personality and Social Psychology Bulletin, 29*, 1147-1158.

Breaugh, J. A., & Klimoski, R. J. (1977). The choice of a group spokesman in bargaining: Member or outsider? *Organizational Behavior and Human Performance, 19*, 325-336.

Brechner, K. C. (1977). An experimental analysis of social traps. *Journal of Experimental Social Psychology, 13*, 552-564.

Brown, L. D. (1983). *Managing conflict at organizational interfaces.* Reading, MA: Addison-Wesley.

Brown, T. (2003). The effect of verbal self-guidance training on collective efficacy and team performance. *Personnel Psychology, 56*, 935-964.

Buller, P. F. (1986). The team building-task performance relation: Some conceptual and methodological refinements. *Group & Organization Studies, 11*, 147-168.

Burnstein, E., & Vinokur, A. (1977). Persuasive argumentation and social comparison as determinants of attitude polarization. *Journal of Experimental Social Psychology, 13*, 315-332.

Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior, 22*, 345-423.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*, 81-105.

Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel Psychology, 46*, 823-850.

Campion, M. A., Papper, E. M., & Medsker, G. J. (1996). Relations between work team characteristics and effectiveness: A replication and extension. *Personnel Psychology, 49*, 429-452.

Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. (1995). Defining team

    competencies: Implications for training requirements and strategies. In R. Guzzo & E.

    Salas (Eds.), *Team effectiveness and decision making in organizations* (pp. 333-380).

    San Francisco, CA: Jossey Bass.

Carlopio, J., Andrewartha, G., & Armstrong, H. (1997). *Developing management skills in*

    Australia. Sydney, Australia: Addison-Wesley.

Caruso, D. R., Mayer, J. D., & Salovey, P. (2002). Emotional intelligence and emotional

    leadership. In R. Riggio, S. Murphy, & F. Pirazzolo (Eds.), *Multiple intelligences and*

    leadership (pp. 55-74). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Catanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood

    regulation: Initial scale development and implications. *Journal of Personality*

    Assessment, 54, 546-563.

Chan, D., & Schmitt, N. (1997). Video-based versus paper-and-pencil method of assessment

    in situational judgment tests: Subgroup differences in test performance and face

    validity perceptions. *Journal of Applied Psychology, 82*, 143-159.

Chen, G., Webber, S. S., Bliese, P. D., Mathieu, J. E., Payne, S. C., Born, D. H., et al. (2002).

    Simultaneous examination of the antecedents and consequences of efficacy beliefs at

    multiple levels of analysis. *Human Performance, 15*, 381-409.

Chertkoff, J. M., & Lane, L. L. (1978). The interactions and perceptions of cooperation and

    competitors in a prisoner's dilemma game versus an expanded prisoner's dilemma

    game. In H. Sauermann (Ed.), *Contributions to experimental economics: Bargaining*

    behavior: Vol. 7. (pp. 1-19). Tubingen, West Germany: Mohr.

Choi, J. N., & Kim, M. U. (1999). The organizational application of groupthink and its

    limitations in organizations. *Journal of Applied Psychology, 84*, 297-306.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385-396.

Cohen, S. G. (1991). New approaches to teams and teamwork. In J. R. Galbraith, E. E. Lawler, & Associates (Eds.), *Organizing for the future: The new logic for managing complex organizations* (pp. 194-226). San Francisco: Jossey-Bass.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management, 23*, 239-290.

Cooper, R. K., & Sawaf, A. (1997). *Executive EQ: Emotional intelligence in leadership and organizations*. New York: Grosset/Putnam.

Costa, P. T., Jr., & McCrae, R. R. (1991). *The NEO Five Factor Inventory: Manual.* New York: Psychological Assessment Resources, Inc.

Costa, P. T., Jr., & McCrae, R. R. (1992a). Four ways five factors are basic. *Personality and Individual Differences, 13*, 653-665.

Costa, P. T., Jr., & McCrae, R. R. (1992b). *The Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual.* Odessa, FL: Psychological Assessment Resources.

Costa, P. T., Jr., McCrae, R. R., & Holland, J. L. (1984). Personality and vocational interests in an adult sample. *Journal of Applied Psychology, 69*, 390-400.

Costello, C. G., & Comrey, A. L. (1967). Scales for measuring depression and anxiety. *Journal of Psychology, 66*, 303-313.

Darley, J., & Latané, B. (1970). *Bystander intervention.* New York: Appleton-Century-Croft.

Davis, J. H. (1973). Group decisions and social interaction: A theory of social decision schemes. *Psychological Review, 80,* 97-125.

Davis, J. H., Kerr, N. L., Stasser, G., Meek, D., & Holt, R. (1977). Victim consequences, sentence severity, and decision processes in mock juries. *Organizational Behavior and Human Performance, 18*, 346-365.

Davis, M. H. (1994). *Empathy: A social psychological approach.* Dubuque, IA: Brown & Benchmark.

Dawda, D., & Hart, S. D. (2000). Assessing emotional intelligence: Reliability and validity of the Bar-On Emotional Quotient Inventory (EQ-*i*) in university students. *Personality and Individual Differences, 28*, 797-812.

Derogatis, L. R. (1983). *SCL-90-R: Administration, scoring and procedure manual II.* Towson, MD: Clinical Psychometric Research.

Dowd, K. O., & Liedtka, J. (1994, Winter). What corporations seek in MBA hires: A survey. *The Magazine of the Graduate Management Admission Council, 10*, 34-39.

Drach-Zahavy, A., & Somech, A. (2001). Understanding team innovation: The role of team processes and structures. *Group Dynamics, 5*, 111-123.

Driskell, J. E., & Salas, E. (1992). Collective behavior and team performance. *Human Factors, 34*, 277-288.

Dubnicki, C., & Limburg, W. J. (1991). How do healthcare teams measure up? *Healthcare Forum, 34*(5), 10-11.

Durham, C. C., Locke, E. A., Poon, J. M. L., & McLeod, P. L. (2000). Effects of group goals and time pressure on group efficacy, information seeking strategy, and performance. *Human Performance, 13*, 115-138.

Dyer, D. J. (1984). Team research and team training: A state-of-the-art review. In F. A. Muckler (Ed.), *Human factors review: 1984* (pp. 285-323). Santa Monica, CA: Human Factors Society.

Earley, P. C. (1994). Self or group? Cultural effects of training on self-efficacy and performance. *Administrative Science Quarterly, 39*, 89-117.

Eden, D. (1990). Pygmalion without interpersonal contrast effects: Whole groups gain from raising manager expectations. *Journal of Applied Psychology, 75*, 394-398.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.

Egan, G. (1970). *Encounter group processes for interpersonal growth.* Belmont, CA: Brooks-Cole.

Ekman, P., & Friesen, W. V. (1975). *Unmasking the face: A guide to recognizing emotions from facial clues.* Englewood Cliffs, NJ: Prentice-Hall.

Elliott, G. C., & Meeker, B. F. (1986). Achieving fairness in the face of competing concerns: The different effects of individual and group characteristics. *Journal of Personality and Social Psychology, 50*, 754-760.

Emmons, R. A., & Colby, P. M. (1995). Emotional conflict and well-being: Relation to perceived availability, daily utilization, and observer reports of social support. *Journal of Personality and Social Psychology, 68*, 947-959.

Evans, C. R, & Dion, K. L. (1991). Group cohesion and performance: A meta-analysis. *Small Group Research, 22*, 175-186.

Fellner, A. N. (2006). *Learning to discriminate terrorists: The effects of emotional intelligence and emotive cues.* Unpublished master's thesis, University of Cincinnati, Cincinnati, OH.

Fellner, A. N., Pérez, J. C., Emo, A., & Matthews, G. (2005, March). *How is trait emotional intelligence related to personality and to mood states?* Paper presented at the annual meeting of the Southern Society for Philosophy and Psychology, Raleigh, NC.

Fellner A. N., Matthews G., Funke G. J., Emo A. K., Zeidner M., Pérez-González, J. C., et al. (2007). The effects of emotional intelligence on visual search of emotional stimuli and emotion identification. *Proceedings of the Human Factors and Ergonomics Society 51st Annual Meeting*, 845-849.

Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology, 43*, 522-527.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117-140.

Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

Fiedler, F. E. (1967). *A theory of leadership effectiveness.* New York: McGraw-Hill.

Fineman, S. (Ed.). (1993). *Emotion in organizations,* Newbury Park, CA: Sage.

Fineman, S. (Ed.). (2000). *Emotion in organizations* (2nd ed.). London: Sage.

Fisher, C. D., & Ashkanasy, N. M. (Eds.). (2000). Emotions in work life [Special issue]. *Journal of Organizational Behavior, 21*(3).

Fleishman, E. A., & Zaccaro, S. J. (1992). Toward a taxonomy of team performance functions. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance* (pp. 31-56). Norwood, NJ: Ablex Publishing Corp.

Freudenthaler, H. H., & Neubauer, A. C. (2005). Emotional intelligence: The convergent and discriminant validities of intra- and inter-personal abilities. *Personality and Individual Differences, 39*, 569-579.

Friedlander, F. (1966). Performance interactional dimensions of organizational work groups. *Journal of Applied Psychology, 50*, 257-265.

Gardner, H. (1983). *Frames of mind*. New York: Basic Books.

George, J. M., & Bettenhausen, K. (1990). Understanding prosocial behavior, sales

    performance, and turnover: A group-level analysis in a service context. *Journal of*

    Applied Psychology, 75, 698-709.

Gersick, C. J. G. (1988). Time and transition in work teams: Toward a new model of group

    development. *Academy of Management Journal, 31*, 9-41.

Ghorbani, N., Bing, M. N., Watson, P. J., Davison, H. K., & Mack, D. A. (2002).

    Self-reported emotional intelligence: Construct similarity and functional dissimilarity

    of higher-order processing in Iran and the United States. *International Journal of*

    Psychology, 37, 297-308.

Gibbs, N. (1995, October 2). The EQ factor. *Time, 146*, 60-68.

Gibson, C. B., & Vermeulen, F. (2003). A healthy divide: Subgroups as a stimulus for team

    learning behavior. *Administrative Science Quarterly, 48*, 202-239.

Gladstein, D. L. (1984). Groups in context: A model of task group effectiveness.

    Administrative Science Quarterly, 29, 499-517.

Gluck, M. A., Shohamy, D., & Myers, C. (2002). How do people solve the "weather

    prediction" task?: Individual variability in strategies for probabilistic category

    learning. *Learning & Memory, 9*, 408-418.

Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ.* New York:

    Bantam Books.

Goleman, D. (1998). *Working with emotional intelligence.* New York: Bantam Books.

Goodman, P. S., Devadas, R., & Hughson, T. L. G. (1988). Groups and productivity: An

    analysis of self-managing teams. In J. P. Campbell (Ed.), *Productivity in*

    organizations (pp. 295-327). San Francisco: Jossey-Bass.

Goodman, P. S., & Leyden, D. P. (1991). Familiarity and group productivity. *Journal of*

    Applied Psychology, 76, 578-586.

Goodman, P. S., Ravlin, E., & Schminkle, M. (1987). Understanding groups in organizations. In L. L. Cummings & B. M. Staw (Eds.). *Research in Organizational Behavior, Vol. 9* (pp. 121-173), Greenwich, CT: JAI Press.

Graziano, W. G., Hair, E. C., & Finch, J. F. (1997). Competitiveness mediates the link between personality and group performance. *Journal of Personality and Social Psychology, 73*, 1394-1408.

Gregorich, S. E., Helmreich, R. L., & Wilhelm, J. A. (1990). The structure of cockpit management attitudes. *Journal of Applied Psychology, 75*, 682-690.

Guzzo, R. A., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual Review of Psychology, 47*, 307-338.

Guzzo, R. A., Yost, P. R., Campbell, R. J., & Shea, G. P. (1993). Potency in groups: Articulating a construct. *British Journal of Social Psychology, 32*, 87-106.

Hackman, J. R. (1983). *A normative model of work team effectiveness* (Tech. Rep. No. 2). New Haven, CT: Yale University, School of Organization and Management. (NTIS No. ADA136398)

Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315-342). Englewood Cliffs, NJ: Prentice-Hall.

Hackman, J. R. (Ed.). (1990). *Groups that work (and those that do not): Creating conditions for effective teamwork.* San Francisco: Jossey-Bass.

Hammond, K. R., Stewart, T. R., Brehmer, B., & Steinmann, D. O. (1975). Social judgement theory. In M. F. Kaplan & S. Schwartz (Eds.), *Human judgement and decision processes* (pp. 271-312). New York: Academic Press.

Hamner, W. E., & Yuki, G. A. (1977). The effectiveness of different offer strategies in bargaining. In D. Druckman (Ed.), *Negotiations: Social-psychological perspectives* (pp. 137-160). London: Sage.

Haptek, Inc. (2004). *People putty.* Available from http://www.haptek.com/

Haptek, Inc. (2008). Haptek news. Retrieved March 24, 2008 from

http://www.haptek.com/?url=http://www.haptek.com/developers/licensing/

Harkins, S. G., & Petty, R. E. (1982). Effects of task difficulty and task uniqueness on social

loafing. *Journal of Personality and Social Psychology, 43*, 1214-1229.

Harkins, S. G., & Szymanski, K. (1987). Social loafing and social facilitation: New wine in

old bottles. In C. Hendrick (Ed.), *Review of personality and social psychology: Vol. 9*

(pp. 167-188). Newbury Park, CA: Sage.

Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond relational demography: Time and

the effects of surface- and deep-level diversity on work group cohesion. *Academy of*

Management Journal, 41, 96-107.

Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2002). Time, teams, and task

performance: Changing effects of surface- and deep-level diversity on group

functioning. *Academy of Management Journal, 45*, 1029-1045.

Hart, S. G., & Staveland, L. E. (1988). Development of a multi-dimensional workload scale:

Results of empirical and theoretical research. In P. A. Hancock & N. Meshkati (Eds.),

Human mental workload (pp. 139-183). Amsterdam: North-Holland.

Härtel, C. E. J., Zerbe, W. J., & Ashkanasy, N. M. (Eds.). (2004). *Emotions in organizational*

behavior. Mahwah, NJ: Erlbaum.

Hassmén, P., Raglin, J. S., & Lundqvist, C. (2004). Intra-individual variability in state

anxiety and self-confidence in elite golfers. *Journal of Sport Behavior, 27*, 277-290.

Helmreich, R., Bakeman, R., & Scherwitz, L. (1973). The study of small groups. *Annual*

Review of Psychology, 24, 337-354.

Hermann**,** M. G., & Kogan, N. (1977). Effects of negotiators' personalities on negotiating

    behavior. In D. Druckman (Ed.), *Negotiations: Social-psychological perspectives* (pp.

    247-274). London: Sage.

Hochschild, A. R. (1983). *The managed heart: Commercialization of human feeling*.

    Berkeley, CA: University of California Press.

Hofmann, D. A., & Stetzer, A. (1996). A crosslevel investigation of factors influencing

    unsafe behaviors and accidents. *Personnel Psychology, 49*, 307-339.

Humphrey, R. H. (2002). Emotions and leadership [Special issue]. *Leadership Quarterly,*

    13(5).

Humphrey, S. E., Hollenbeck, J. R., Meyer, C. J., & Ilgen, D. R. (2002). Hierarchical team

    decision making. In G. R. Ferris & J. J. Martocchio (Eds.), *Research in personnel and*

    human resources management (pp. 175-214). New York: Elsevier/JAI Press.

Hunter, J. E., Schmidt, F. L., & Judiesch, M. K. (1990). Individual differences in output

    variability as a function of job complexity. *Journal of Applied Psychology, 75*, 28-42.

Hyatt, D. E., & Ruddy, T. M. (1997). An examination of the relationship between work group

    characteristics and performance: Once more into the breech. *Personnel Psychology,*

    50, 553-585.

Ilgen, D. R. (1999). Teams embedded in organizations: Some implications. *American*

    Psychologist, 54, 129-139.

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations:

    From input-process-output models to IMOI models. *Annual Review of Psychology,*

    56, 517-543.

Jabri, M. M. (1991). The development of conceptually independent sub-scales in the

    measurement of modes of problem solving. *Educational and Psychological*

    Measurement, 51, 975-983.

Jackson, S. E., Brett, J. F., Sessa, V. I., Cooper, D. M., Julin, J. A., & Peyronnin. K. (1991). Some differences make a difference: Individual dissimilarity and group heterogeneity as correlates of recruitment, promotion, and turnover. *Journal of Applied Psychology, 76*, 675-689.

Jacobs, D., & Singell, L. (1993). Leadership and organizational performance: Isolating links between managers and collective success. *Social Science Research, 22*, 165-189.

Janis, I. (1972). *Victims of groupthink: A psychological study of foreign-policy decisions and fiascoes.* Oxford, England: Houghton Mifflin.

Jordan, P. J. (2000, August). Measuring emotional intelligence in the workplace: A comparison of self and peer ratings of emotional intelligence. In P. J. Jordan (Chair), *Emotional intelligence at work: Does it make a difference?* Symposium conducted at the annual meeting of the Academy of Management, Toronto, Canada.

Jordan, P. J., Ashkanasy, N. M., Härtel, C. E. J., & Hooper, G. S. (2002). Workgroup emotional intelligence: Scale development and relationship to team process effectiveness and goal focus. *Human Resource Management Review, 12*, 195-214.

Jordan, P. J., & Troth, A. C. (2004). Managing emotions during team problem solving. *Human Performance, 17*, 195-218.

Katz, R. L. (1982). The effects of group longevity on project communication and performance. *Administrative Science Quarterly, 27*, 81-104.

Kelley, H. H., & Thibaut, J. W. (1978). *Interpersonal relations: A theory of interdependence.* New York: Wiley.

Kerr, N. L. (1978). Severity of prescribed penalty and mock jurors' verdicts. *Journal of Personality and Social Psychology, 36*, 1431-1442.

Kimmel, M. J., Pruitt, D. G., Magenau, J. M., Konar-Goldband, E., & Carnevale, P. J. D. (1980). Effects of trust, aspiration, and gender on negotiation tactics. *Journal of Personality and Social Psychology, 38*, 9-22.

King, L. A., & Emmons, R. A. (1990). Conflict over emotional expression: Psychological and physical correlates. *Journal of Personality and Social Psychology, 58*, 864-877.

Klein, H. J., & Lee, S. (2006). The effects of personality on learning: The mediating role of goal setting. *Human Performance, 19*, 43-66.

Klein, K. J., & Kozlowski, S. W. J. (Eds.) (2000). *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*. San Francisco: Jossey-Bass.

Kleinman, D. L., & Serfaty, D. (1989). Team performance assessment in distributed decision making. In R. Gilson, J. P. Kincaid, & B. Goldiez (Eds.), *Proceedings of the Interactive Networked Simulation for Training Conference* (pp. 22-27). Orlando, FL: Institute for Simulation and Training.

Kolodny, H. F., & Kiggundu, M. N. (1980). Towards the development of a sociotechnical systems model in woodlands mechanical harvesting. *Human Relations, 33*, 623-645.

Komorita, S. S. (1976). A model of the N-person dilemma-type game. *Journal of Experimental Social Psychology, 12*, 357-373.

Lafferty, J. C., & Eady, P. M. (1973). *The subarctic survival situation.* Grosse Pointe, MI: Experiential Learning Methods.

Laughlin, P. R. (1978). Ability and group problem solving. *Journal of Research & Development in Education, 12*, 114-120.

Lavery, T. A., Franz, T. M., Winquist, J. R., & Larson, J. R. (1999). The role of information exchange in predicting group accuracy on a multiple judgment task. *Basic and Applied Social Psychology, 21*, 281-289.

Lennox, R. D., & Wolfe, R. N. (1984). Revision of the Self-Monitoring Scale. *Journal of Personality and Social Psychology, 46,* 1349-1364.

LePine, J. A. (2003). Team adaptation and postchange performance: The effects of team composition in terms of members' cognitive ability and personality. *Journal of Applied Psychology, 88,* 27-39.

Levine, J. M., & Moreland, R. L. (1990). Progress in small group research. *Annual Review of Psychology, 41,* 585-634.

Lewis, K. (2003). Measuring transactive memory systems in the field: Scale development and validation. *Journal of Applied Psychology, 88,* 587-604.

Lewis, S. A., & Fry, W. R. (1977). Effects of visual access and orientation on the discovery of integrative bargaining alternatives. *Organizational Behavior and Human Performance, 20,* 75-92.

Lindskold, S. (1978). Trust development, the GRIT proposal, and the effects of conciliatory acts on conflict and cooperation. *Psychological Bulletin, 85,* 772-793.

Littlepage, G., Robison, W., & Reddington, K. (1997). Effects of task experience and group experience on group performance, member ability, and recognition of expertise. *Organizational Behavior and Human Decision Processes, 69,* 133-147.

Losada, M. (1999). The complex dynamics of high performing teams. *Mathematical and Computer Modelling, 30,* 179-192.

Lovelace, K., Shapiro, D. L., & Weingart, L. R. (2001). Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective. *Academy of Management Journal, 44,* 779-793.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33,* 335-343.

MacCann, C., & Roberts, R. D. (2008). New paradigms for assessing emotional intelligence: Theory and data. *Emotion, 8*, 540-551.

Mackie, D. M., & Goethals, G. R. (1987). Individual and groups goals. In C. Hendrick (Ed.), *Review of personality and social psychology: Vol. 8.* (pp. 144-166). Newbury Park, CA: Sage.

Magjuka, R. J., & Baldwin, T. T. (1991). Team-based employee involvement programs: Effects of design and administration. *Personnel Psychology, 44*, 793-812.

Marks, M., & Panzer, F. (2004). The influence of team monitoring on team processes and performance. *Human Performance, 17*, 25-41.

Marks, M. A. (1999). A test of the impact of collective efficacy in routine and novel performance environments. *Human Performance, 12*, 295-309.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review, 26*, 356-376.

Marks, M. A., Sabella, M. J., Burke, C. S., & Zaccaro, S. J. (2002). The impact of cross-training on team effectiveness. *Journal of Applied Psychology, 87*, 3-13.

Marks, M. L., Mirvis, P. H., Hackett, E. J., & Grady, J. F. (1986). Employee participation in a Quality Circle program: Impact on quality of work life, productivity, and absenteeism. *Journal of Applied Psychology, 71*, 61-69.

Marwell, G., & Ames, R. E. (1979). Experiments on the provision of public goods. I. Resources, interest, group size, and the free-rider problem. *American Journal of Sociology, 84*, 1335-1360.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85*, 273-283.

Matthews, G. (2000). Levels of transaction: A cognitive science framework for operator stress. In P. A. Hancock & P. A. Desmond (Eds.), *Stress, workload and fatigue* (pp. 5-33). Mahwah, NJ: Lawrence Erlbaum Associates Inc.

Matthews, G., Campbell, S. E., Falconer, S., Joyner, L. A., Huggins, J., Gilliland, K., et al. (2002). Fundamental dimensions of subjective state in performance settings: Task engagement, distress, and worry. *Emotion, 2*, 315-340.

Matthews, G., Davies, D. R., & Lees, J. L. (1990). Arousal, extraversion, and individual differences in resource availability. *Journal of Personality and Social Psychology, 59*, 150-168.

Matthews, G., Davies, D. R., Westerman, S. J., & Stammers, R. B. (2000). *Human performance: Cognition, stress and individual differences.* Philadelphia: Psychology Press.

Matthews, G., Deary, I. J., & Whiteman, M. C. (2003). *Personality traits.* Cambridge, UK: Cambridge University Press.

Matthews, G., Joyner, L., Gilliland, K., Campbell, S. E., Huggins, J., & Falconer, S. (1999). Validation of a comprehensive stress state questionnaire: Towards a state "Big Three"? In I. Mervielde, I. J. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe, Vol. 7* (pp. 335-350). Tilburg, The Netherlands: Tilburg University Press.

Matthews, G., Zeidner, M., & Roberts R. D. (2002). *Emotional intelligence: Science or myth?* Cambridge, MA: MIT Press.

Matthews, G., Zeidner, M., & Roberts R. D. (2007). Emotional intelligence: Consensus, controversies, and questions. In G. Matthews, M. Zeidner, & R. Roberts (Eds.), *The science of emotional intelligence: Knowns and unknowns.* New York: Oxford University Press.

Maxwell, S. E., & Delaney, H. D. (2004). *Designing experiments and analyzing data: A model comparison perspective* (2nd ed.). Mahwah, NJ: Erlbaum.

Mayer, J. D., Caruso, D., & Salovey, P. (1999). Emotional intelligence meets traditional standards for an intelligence. *Intelligence, 27*, 267-298.

Mayer, J. D., Caruso, D., & Salovey, P. (2000). Selecting a measure of emotional intelligence: The case of ability scales. In R. Bar-On & J. D. A. Parker (Eds.), *The handbook of emotional intelligence* (pp. 320-342). San Francisco: Jossey-Bass.

Mayer, J. D., DiPaolo, M., & Salovey, P. (1990). Perceiving affective content in ambiguous visual stimuli: A component of emotional intelligence. *Journal of Personality Assessment, 54*, 772-781.

Mayer, J. D., Gaschke, Y. N., Braverman, D. L., & Evans, T. W. (1992). Mood-congruent judgment is a general effect. *Journal of Personality and Social Psychology, 63*, 119-132.

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. Sluyter (Eds.), *Emotional development and emotional intelligence: Implications for educators* (pp. 3-31). New York: Basic Books.

Mayer, J. D., Salovey, P., & Caruso, D. (2000a). Emotional intelligence as a *Zeitgeist*, as personality, and as a mental ability. In R. Bar-On & J. D. A. Parker (Eds.), *The handbook of emotional intelligence* (pp. 92-117). San Francisco: Jossey-Bass.

Mayer, J. D., Salovey, P., & Caruso, D. (2000b). Models of emotional intelligence. In R. Sternberg (Ed.), *Handbook of intelligence* (pp. 396-420). Cambridge, UK: Cambridge University Press.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2002). *Mayer-Salovey-Caruso Emotional Intelligence Test User's Manual.* Toronto, Canada: Multi-Health Systems.

McDaniel, M. A., & Nguyen, N. T. (2001). Situational judgment tests: A review of practice and constructs assessed. *International Journal of Selection and Assessment, 9*, 103-113.

McGrath, J. E. (1997). Small group research, that once and future field: An interpretation of the past with an eye to the future. *Group Dynamics: Theory, Research, and Practice, 1*, 7-27.

McGrath, J. E., & Kravitz, D. A. (1982). Group research. *Annual Review of Psychology, 33*, 195-230.

McIntyre, R. M., & Salas, E. (1995). Measuring and managing for team performance: Emerging principles from complex environments. In R. Guzzo & E. Salas (Eds.), *Team effectiveness and decision making in organizations* (pp. 149-203). San Francisco: Jossey-Bass.

McNair, D. M., Lorr, M., & Droppleman, L. F. (1992). *POMS manual.* San Diego, CA: Educational and Industrial Testing Service.

Meister, D. (1985). *Behavioral foundations of system development* (2nd ed.). Malabar, FL: Robert E. Krieger.

Miller, R. S., & Schlenker, B. R. (1985). Egotism in group members: Public and private attributions of responsibility for group performance. *Social Psychology Quarterly, 48*, 85-89.

Mitchell, T. R., & Silver, W. S. (1990). Individual and group goals when workers are interdependent: Effects on task strategies and performance. *Journal of Applied Psychology, 75*, 185-193.

Montoya-Weiss, M. M., Massey, A. P., & Song, M. (2001). Getting it together: Temporal coordination and conflict management in global virtual teams. *Academy of Management Journal, 44*, 1251-1262.

Moon, H., Hollenbeck, J. R., Humphrey, S. E., Ilgen, D. R., West, B. J., Ellis, A. P. J., et al. (2004). Asymmetric adaptability: Dynamic team structures as one-way streets. *Academy of Management Journal, 47*, 681-695.

Morgan, B. B., Jr., Glickman, A. S., Woodward, E. A., Blaiwes, A. S., & Salas, E. (1986). *Measurement of team behaviours in a Navy environment.* NTSC technical report TR-86-014. Orlando, FL: Naval Training Systems Center.

Morgan, B. B., Jr., Herschler, D. A., Wiener, E. L., & Salas, E. (1993). Implications of automation technology for aircrew coordination performance. In W. B. Rouse (Ed.), *Human/technology interaction in complex systems* (Vol. 6, pp. 105-136). Greenwich, CT: JAI Press.

Morgan, B. B., Jr., Salas, E., & Glickman, A. S. (1993). An analysis of team evolution and maturation. *Journal of General Psychology, 120*, 277-291.

Motowidlo, S. J., Dunnette, M. D., & Carter, G. W. (1990). An alternative selection procedure: The low-fidelity simulation. *Journal of Applied Psychology, 75*, 640-647.

Mullen, B., & Copper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological Bulletin, 115*, 210-227.

Myers, D. G., & Lamm, H. (1976). The group polarization phenomenon. *Psychological Bulletin, 83*, 602-627.

Naylor, J. C., & Dickinson, T. L. (1969). Task structure, work structure, and team performance. *Journal of Applied Psychology, 53*, 167-177.

Neuman, G. A., & Wright, J. (1999). Team effectiveness: Beyond skills and cognitive ability. *Journal of Applied Psychology, 84*, 376-389.

O'Brien, G. E., & Owens, A. G. (1968). *Member intelligence and group productivity* (Australian Military Forces Research Report No. 6-68).

Offermann, L., Bailey, J., Vasilopoulos, N., Seal, C., & Sass, M. (2004). The relative

contributions of emotional competence and cognitive ability to individual and team

performance. *Human Performance, 17*, 219-243.

Oser, R. L., McCallum, G. A., Salas, E., & Morgan, B. B., Jr. (1989). *Toward a definition of*

teamwork: An analysis of critical team behaviors (NTSC Tech. Rep. No. 90-009).

Orlando, FL: Naval Training Systems Center.

Paris, C. R., Salas, E., & Cannon-Bowers, J. A. (2000). Teamwork in multi-person systems:

A review and analysis. *Ergonomics*, *43*, 1052-1075.

Parrott, A. C., Garnham, N. J., Wesnes, K., & Pincock, C. (1996). Cigarette smoking and

abstinence: Comparative effects upon cognitive task performance and mood state over

24 hours. *Human Psychopharmacology, 11*, 391-400.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological*

Assessment, 5, 164-172.

Payne, R., & Cooper, C. L. (Eds.). (2001). *Emotions at work: Theory, research, and*

applications for management. Chichester, UK: Wiley.

Pearce, J. A., III, & Ravlin, E. C. (1987). The design and activation of self-regulating work

groups. *Human Relations, 40*, 751-782.

Pearson, C. A. L. (1987). Participative goal strategy for improving performance and job

satisfaction: A longitudinal evaluation with railway track maintenance gangs. *Human*

Relations, 40, 473-488.

Penley, J. A., & Tomaka, J. (2002) Associations among the Big Five, emotional responses,

and coping with acute stress. *Personality and Individual Differences, 32*, 1215-1228.

Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric

investigation with reference to established trait taxonomies. *European Journal of*

Personality, 15, 425-448.

Petrides, K. V., & Furnham, A. (2003). Trait emotional intelligence: Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality, 17*, 39-57.

Petrides, K. V., Pérez, J. C., & Furnham, A. (2003, July). The Trait Emotional Intelligence Questionnaire (TEIQue): A measure of emotional self-efficacy. In E. J. Austin & D. H. Saklofske (Chairs), *Emotional Intelligence*. Symposium conducted at the 11th Biennial Meeting of the International Society for the Study of the Individual Differences. Graz, Austria.

Porter, C. O. L. H., Hollenbeck, J. R., Ilgen, D. R., Ellis, A. P. J., West, B. J., & Moon, H. (2003). Backing up behaviors in teams: The role of personality and legitimacy of need. *Journal of Applied Psychology,* 88, 391-403.

Prince, C., & Salas, E. (1993). Training and research for teamwork in the military aircrew. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 337-366). Orlando, FL: Academic Press.

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 111-118.

Rafaeli, A., & Sutton, R. I. (1989). The expression of emotion in organizational life. *Research in Organizational Behavior, 11*, 1-42.

Rahim, M. A. (1983). A measure of style of handling interpersonal conflict. *Academy of Management Journal, 26*, 368-376.

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality, 41*, 203-212.

Reber, A. S, Walkenfeld, F. F., & Hernstadt, R. (1991). Implicit and explicit learning: Individual differences and IQ. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 17*, 888-896.

Riggio, R. E. (1986). Assessment of basic social skills. *Journal of Personality and Social Psychology, 51*, 649-660.

Riordan, C. M., & Shore, L. M. (1997). Demographic diversity and employee attitudes: An empirical examination of relational demography within work units. *Journal of Applied Psychology,* 82, 342-358.

Roberts, R. D. (2000). Openness Conscientiousness Extraversion Agreeableness Neuroticism Index Condensed (OCEANIC) Test Manual. Sydney, Australia: E-ntelligence Testing Products.

Roseman, I. J. (2001). A model of appraisal in the emotion system: Integrating theory, research, and applications. In K. R. Scherer & A. Schorr (Eds.), *Appraisal processes in emotion: Theory, methods, research.* (pp. 68-91). New York: Oxford University Press.

Rosenberg, M. (1965). *Society and the adolescent self-image.* Princeton, NJ: Princeton University Press.

Rouse, W. B., & Morris, N. M. (1986). On looking into the black box: Prospects and limits in the search for mental models. *Psychological Bulletin, 100*, 349-363.

Rubin, Z. (1970). Measurement of romantic love. *Journal of Personality and Social Psychology, 16*, 265-273.

Rumelhart, D. D., & Ortony, A. (1977). The representation of knowledge in memory. In R. C. Anderson & R. J. Spiro (Eds.), *Schooling and the acquisition of knowledge* (pp. 99-135)*.* Hillsdale, NJ: Lawrence Erlbaum.

Saklofske, D. H., Austin, E. J., & Minski, P. S. (2003). Factor structure and validity of a trait emotional intelligence measure. *Personality and Individual Differences, 34*, 707-721.

Salancik, G., & Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Administrative Science Quarterly, 23*, 224-253.

Salas, E., & Cannon-Bowers, J. A. (1997). Methods, tools, and strategies for team training. In M. A. Quiñones & A. Ehrenstein (Eds.), *Training for a rapidly changing workplace: Applications of psychological research* (pp. 249-279). Washington, DC: American Psychological Association.

Salas, E., & Cannon-Bowers, J. A. (2000). The anatomy of team training. In S. Tobias & J. D. Fletcher (Eds.), *Training and retraining: A handbook for business, industry, government, and the military* (pp. 312-335). New York: MacMillan.

Salas, E., Dickinson, T. L., Converse, S. A., & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance* (pp. 3-29). Norwood, NJ: Ablex Publishing Corp.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*, 185-211.

Salovey, P., Mayer, J. D., Goldman, S., Turvey, C., & Palfai, T. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 125-154). Washington, DC: American Psychological Association.

Saucier, G. (2003). Orthogonal markers for orthogonal factors: The case of the Big Five. *Journal of Research in Personality, 36*, 1-31.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology, 4*, 219-247.

Schiflett, S. G., Elliott, L. R., Salas, E., & Coovert, M. D., (Eds.). (2004). *Scaled worlds: Development, validation and applications*. Aldershot, Hants, England: Ashgate.

Schmidt, F. L., & Hunter, J. E. (1993). Tacit knowledge, practical intelligence, general mental ability, and job knowledge. *Current Directions in Psychological Science, 2*, 8-9.

Schulz, J. W., & Pruitt, D. G. (1978). The effects of mutual concern on joint welfare. *Journal of Experimental Social Psychology, 14*, 480-492.

Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., et al. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25*, 167-177.

Shea, G. P., & Guzzo, R. A. (1987). Groups as human resources. In K. M. Rowland & G. R. Ferris (Eds.), *Research in Personnel and Human Resources Management: Vol. 5.* (pp. 323-356). Greenwich, CT: JAI Press.

Simons, T. L., & Peterson, R. S. (2000). Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust. *Journal of Applied Psychology, 85*, 102-111.

Sivasubramaniam, N., Murry, W. D., Avolio, B. J., & Jung, D. I. (2002). A longitudinal model of the effects of team leadership and group potency on group performance. *Group and Organization Management, 27*, 66-96.

Smith, K. A., Smith, K. G., Olian, J. D., Sims, H. P., O'Bannon, D. P., & Scully, J. (1994). Top management team demography and process: The role of social integration and communication. *Administrative Science Quarterly, 39*, 412-438.

Smith-Jentsch, K. A., Johnston, J. H., & Payne, S. C. (1998). Measuring team-related expertise in complex environments. In J. A. Cannon-Bowers & E. Salas (Eds.),

Making decisions under stress: Implications for individual and team training
(pp. 61-87). Washington, D.C.: American Psychological Association.

Smith-Jentsch, K. A., Salas, E., & Baker, D. (1996). Training team performance-related
assertiveness. *Personnel Psychology, 49*, 909-936.

Smith-Jentsch, K. A., Zeizig, R. L., Acton, B., & McPherson, J. A. (1998). Team dimensional
training: A strategy for guided team self-correction. In J. A. Cannon-Bowers & E.
Salas (Eds.), *Making decisions under stress: Implications for individual and team
training* (pp. 271-297). Washington, D.C.: American Psychological Association.

Spencer, L. M. (2001). The economic value of emotional intelligence competencies and EIC
based HR programs. In C. Cherniss & D. Goleman (Eds.), *The emotionally intelligent
workplace* (pp. 45-82). San Francisco: Jossey-Bass.

Stake, J. E. (1983). Factors in reward distribution: Allocator motive, gender, and Protestant
ethic endorsement. *Journal of Personality and Social Psychology, 44*, 410-418.

Stankov, L. (2000). *The Gf/Gc quickie test battery*. University of Sydney, NSW, Australia:
School of Psychology.

Stein, B. A., & Kanter, R. M. (1980). Building the parallel organization: Creating
mechanisms for permanent quality of work life. *Journal of Applied Behavioral
Science, 16*, 371-388.

Sternberg, R. J., Conway, B. E., Ketron, J. L., & Bernstein, M. (1981). People's conceptions
of intelligence. *Journal of Personality and Social Psychology, 41*, 37-55.

Sternberg, R. J., & Wagner, R. K. (1993). The g-ocentric view of intelligence and job
performance is wrong. *Current Directions in Psychological Science, 2*, 1-12.

Sternberg, R. J., Wagner, R. K., Williams, W. M., & Horvath, J. A. (1995). Testing common
sense. *American Psychologist, 50*, 912-927.

Stout, R. J., Cannon-Bowers, J. A., Salas, E., & Milanovich, D. M. (1999). Planning, shared mental models, and coordinated performance: An empirical link is established. *Human Factors, 41*, 61-71.

Sundstrom, E., & Altman, I. (1989). Physical environments and work-group effectiveness. In L. L. Cummings & B. M. Shaw (Eds.), *Research in Organizational Behaviour, Vol. 11* (pp. 175-209) Greenwich, CT: JAI Press. Washington, D.C.: American Psychological Association.

Sundstrom, E., De Meuse, K. P., & Futrell, D. (1990). Work teams: Applications and effectiveness. *American Psychologist, 45*, 120-133.

Szalma, J. L., Hancock, P. A., Dember, W. N., & Warm, J. S. (2006). Training for vigilance: The effect of knowledge of results format and dispositional optimism and pessimism on performance and stress. *British Journal of Psychology, 97*, 115-135.

Taylor, G. J., Ryan, D., & Bagby, R. M. (1985). Toward the development of a new self-report alexithymia scale. *Psychotherapy and Psychosomatics, 44*, 191-199.

Thelen, H. A. (1954). *Methods for studying work and emotionality in group operation.* Chicago: University of Chicago Press.

Thibaut, J. W., & Kelley, H. H. (1959). *The social psychology of groups.* New York: Wiley.

Thomas, K. W. (1977). Conflict and conflict management. In M. D. Dunnette (Ed.), *The handbook of industrial and organizational psychology* (pp. 839-935). Chicago: Rand McNally.

Thorndike, E. L. (1920). Intelligence and its uses. *Harper's Magazine, 141*, 227-235.

Tindale, R. S., & Davis, J. H. (1985). Individual and group reward allocation decisions in two situational contexts: Effects of relative need and performance. *Journal of Personality and Social Psychology, 48*, 1148-1161.

Tjosvold, D. (1977). The effects of the constituent's affirmation and the opposing negotiator's self-presentation in bargaining between unequal status groups. *Organizational Behavior and Human Performance, 18*, 146-157.

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & Organization Studies, 2*, 419-427.

Van Steenberg LaFarge, V. (1995). Termination in groups. In J. Gillette & M. McCollum (Eds.), *Groups in context: A new perspective on group dynamics*, (pp. 82-103). Lanham, MD: University Press of America.

Vollrath, M. (2000). Personality and hassles among university students: A three-year longitudinal study. *European Journal of Personality, 14*, 199-215.

Volpe, C. E., Cannon-Bowers, J. A., Salas, E., & Spector, P. (1996). The impact of cross training on team functioning. *Human Factors, 38*, 87-100.

Wagner, R. K., & Sternberg, R. J. (1991). *Tacit Knowledge Inventory for Managers: Test booklet.* San Antonio, TX: The Psychological Corporation.

Wall, J. A., Jr. (1977). Operantly conditioning a negotiator's concession making. *Journal of Experimental Social Psychology, 13*, 431-440.

Wallace, M. J., Jr., & Schwab, D. P. (1976). A cross-validated comparison of five models used to predict graduate admissions committee decisions. *Journal of Applied Psychology, 61*, 559-563.

Waller, M. J. (1999). The timing of adaptive group responses to nonroutine events. *Academy of Management Journal, 42*, 127-137.

Wang, L., Zhuang, X., Liu, L., MacCann, C., & Roberts, R. D. (in press). Assessing teamwork skills: A review, some data, and some assessments. *Educational Testing Service Research Report Series*.

Watson, W. E., Michaelsen, L. K., & Sharp, W. (1991). Member competence, group

    interaction, and group decision making: A longitudinal study. *Journal of Applied*

    Psychology, 76, 803-809.

Wechsler, D. (1944). *The measurement of adult intelligence* (3rd ed.). Baltimore: Williams &

    Wilkins.

Wechsler, D. (1958). *The measurement and appraisal of adult intelligence*. Baltimore:

    Williams & Wilkins.

Weekley, J. A., & Jones, C. (1999). Further studies of situational tests. *Personnel*

    Psychology, 52, 679-700.

Weingart, L. R. (1992). Impact of group goals, task component complexity, effort, and

    planning on group performance. *Journal of Applied Psychology, 77*, 682-693.

Weiss, H., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the

    structure, causes and consequences of affective experiences at work. *Research in*

    Organizational Behavior, 18, 1-79.

Weiss, H. M. (Ed.). (2001). Affect at work: Collaborations of basic and organizational

    research [Special issue]. *Organizational Behavior and Human Decision Processes,*

    86(1).

Weldon, E., & Gargano, G. M. (1988). Cognitive loafing: The effects of accountability and

    shared responsibility on cognitive effort. *Personality and Social Psychology Bulletin,*

    14, 159-171.

Weldon, E., & Weingart, L. R. (1993). Group goals and group performance. *British Journal*

    of Social Psychology, 32, 307-334.

Williams, K., Harkins, S., & Latané, B. (1981). Identifiability as a deterrent to social loafing:

    Two cheering experiments. *Journal of Personality and Social Psychology, 40*,

    303-311.

Wonderlic & Associates. (1983). *Wonderlic Personnel Test manual.* Northfield, IL: Author.

Wonderlic Personnel Test, Inc. (1992). *Wonderlic Personnel Test user's manual.* Libertyville, IL: Author.

Worchel, S. (1994). You can go home again: Returning group research to the group context with an eye on developmental issues. *Small Group Research, 25*, 205-223.

Zaccaro, S. J. (1984). Social loafing: The role of task attractiveness. *Personality and Social Psychology Bulletin, 10*, 99-106.

Zaccaro, S. J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of team decision making under temporal urgency. *Military Psychology, 7*, 77-93.

Zaccaro, S. J., Peterson, C., & Walker, S. (1987). Self-serving attributions for individual and group performance. *Social Psychology Quarterly, 50*, 257-263.

Appendix A—Stimulus Examples

a. Positive expression

b. Negative expression

INSTRUCTIONS: *Please read each statement and decide whether or not you agree with it. Answer by putting a circle around the number that best shows how much you agree or disagree with each statement.*

1 Completely Disagree	2	3	4	5	6	7 Completely Agree

1. I try to think good thoughts no matter how badly I feel.	1	2	3	4	5	6	7
2. People would be better off if they felt less and thought more.	1	2	3	4	5	6	7
3. I don't think it's worth paying attention to your emotions or moods.	1	2	3	4	5	6	7
4. I don't usually care much about what I'm feeling.	1	2	3	4	5	6	7
5. Sometimes I can't tell what my feelings are.	1	2	3	4	5	6	7
6. I am rarely confused about how I feel.	1	2	3	4	5	6	7
7. Feelings give direction to life.	1	2	3	4	5	6	7
8. Although I am sometimes sad, I have a mostly optimistic outlook.	1	2	3	4	5	6	7
9. When I am upset I realize that the "good things in life" are illusions.	1	2	3	4	5	6	7
10. I believe in acting from the heart.	1	2	3	4	5	6	7
11. I can never tell how I feel.	1	2	3	4	5	6	7
12. The best way for me to handle my feelings is to experience them to the fullest.	1	2	3	4	5	6	7
13. When I become upset I remind myself of all the pleasures in life.	1	2	3	4	5	6	7
14. My beliefs and opinions always seem to change depending on how I feel.	1	2	3	4	5	6	7
15. I am often aware of my feelings on a matter.	1	2	3	4	5	6	7
16. I am usually confused about how I feel.	1	2	3	4	5	6	7
17. One should never be guided by emotions.	1	2	3	4	5	6	7
18. I never give into my emotions.	1	2	3	4	5	6	7
19. Although I am sometimes happy, I have a mostly pessimistic outlook.	1	2	3	4	5	6	7
20. I feel at ease about my emotions.	1	2	3	4	5	6	7
21. I pay a lot of attention to how I feel.	1	2	3	4	5	6	7
22. I can't make sense out of my feelings.	1	2	3	4	5	6	7
23. I don't pay much attention to my feelings.	1	2	3	4	5	6	7
24. I often think about my feelings.	1	2	3	4	5	6	7
25. I am usually very clear about my feelings.	1	2	3	4	5	6	7
26. No matter how badly I feel, I try to think about pleasant things.	1	2	3	4	5	6	7
27. Feelings are a weakness humans have.	1	2	3	4	5	6	7
28. I usually know my feelings about a matter.	1	2	3	4	5	6	7
29. It is usually a waste of time to think about your emotions.	1	2	3	4	5	6	7
30. I almost always know exactly how I am feeling.	1	2	3	4	5	6	7

Instructions: Each of the following questions describes a situation and asks you to choose which of five emotions is most likely to result from that situation.

Here is an example:

_____1.   Clara receives a gift. *Clara is most likely to feel?*
(a) happy (b) angry (c) frightened (d) bored (e) hungry

If you think Clara is most likely to feel happy, mark option A and then move to the next question. There are 42 questions.

Items:

_____1.   A pleasant experience ceases unexpectedly and there is not much that can be done about it. The person *involved is most likely to feel?*
(a) Ashamed (b) Distressed (c) Angry (d) Sad (e) Frustrated

_____2.   Xavier completes a difficult task on time and under budget. *Xavier is most likely to feel*?
(a) Surprise (b) Pride (c) Relief (d) Hope (e) Joy

_____3.   An irritating neighbor of Eve's moves to another state. *Eve is most likely to feel?*
(a) Regret (b) Hope (c) Relief (d) Sadness (e) Joy

_____4.   There is great weather on the day Jill is going on an outdoor picnic. *Jill is most likely to feel?*
(a) Pride (b) Joy (c) Relief (d) Guilt (e) Hope

_____5.   Regret is most likely to occur when?
(a) Events are unexpected
(b) You have caused something you didn't want to happen and cannot change it.
(c) Circumstances have caused something you didn't want to happen.
(d) You have caused something you didn't want to happen and are trying to change it.
(e) Events are getting beyond your control.

_____6.   Edna's workmate organizes a goodbye party for Edna, who is going on vacation. *Edna is most likely to feel?*
(a) Surprise (b) Gratitude (c) Pride (d) Hope (e) Relief

_____7.   Something unpleasant is happening. Neither the person involved, nor anyone else can make it stop. *The person involved is most likely to feel?*
(a) Guilty (b) Distressed (c) Sad (d) Scared (e) Angry

_____8.   If the current situation continues, Denise's employer will probably be able to move her job to a location much closer to her home, which she really wants. *Denise is most likely to feel?*
(a) Distress (b) Joy (c) Surprise (d) Hope (e) Fear

_____9. Sonia finds out that a friend of hers has borrowed money from others to pay urgent bills, but has in fact used the money for less serious purposes. *Sonia is most likely to feel?*
(a) Anger (b) Excitement (c) Contempt (d) Shame (e) Horror

_____10. Somebody is most likely to feel surprised after?
(a) Something unexpected happens.
(b) Something unfamiliar happens.
(c) Something unusual happens.
(d) Something scary happens.
(e) Something silly happens.

_____11. April works as a troubleshooter. She is presented with a common-looking problem but cannot work out how to solve it. *April is most likely to feel?*
(a) Confused (b) Frustrated (c) Surprised (d) Relieved (e) Distressed

_____12. Charles is meeting a friend to see a movie. The friend is very late and they are not in time to make it to the movie. *Charles is most likely to feel?*
(a) Depressed (b) Frustrated (c) Angry (d) Contemptuous (e) Distressed

_____13. Rashid needs to meet a quota before his performance review. There is only a small chance that he will be able to do so and there isn't much he can do to improve the outcome. *Rashid is most likely to feel?*
(a) Irritated (b) Scared (c) Distressed (d) Sad (e) Hopeful

_____14. Someone believes that another person harmed them on purpose. There is not a lot that can be done to make things better. *The person involved is most likely to feel?*
(a) Dislike (b) Rage (c) Jealousy (d) Surprise (e) Anxiety

_____15. Phil's workmate Bart asks Phil to lie for him about money Bart has been stealing from the company. Phil does not agree. *Phil is most likely to feel?*
(a) Excitement (b) Anger (c) Horror (d) Contempt (e) Shame

_____16. Jim enjoys spending Saturdays playing with his children in the park. This year they have sporting activities on Saturdays and cannot go to the park with him any more. *Jim is most likely to feel?*
(a) Angry (b) Sad (c) Frustrated (d) Distressed (e) Ashamed

_____17. If all goes well, then it's fairly likely that Derek's house will increase in value. *Derek is most likely to feel?*
(a) Distress (b) Fear (c) Surprise (d) Joy (e) Hope

_____18. Sheila's workmate intentionally does not give Sheila some important information about applying for a raise. *Sheila is most likely to feel?*
(a) Depressed (b) Contemptuous (c) Frustrated (d) Angry (e) Distressed

_____19. Megan is looking to buy a house. Something happened and she felt regret. *What is most likely to have happened?*
(a) She didn't make an offer on a house she wanted, and now she is trying to find out if it is too late.
(b) She found a house she liked that she didn't think she would find.
(c) She couldn't make an offer on a house she liked because the bank didn't get her the money in time.
(d) She didn't make an offer on a house she liked and now someone else has bought it.
(e) She made an offer on a house and is waiting to see if it is accepted.

_____20. Mary was working at her desk. Something happened that caused her to feel surprised. *What is most likely to have happened?*
(a) Her co-worker told a silly joke.
(b) She was working on a new task she hadn't dealt with before.
(c) She found some results that were different from what she thought they would be.
(d) She realized she would not be able to complete her work.
(e) She had to do a task she didn't normally do at work.

_____21. Garry's small business is attracting less and less clients and he can't tell why. There doesn't seem to be anything he can do to help matters. *Garry is most likely to feel?*
(a) Scared (b) Angry (c) Sad (d) Guilty (e) Distressed

_____22. Someone thinks that another person has deliberately caused something good to happen to them. *They are most likely to feel?*
(a) Hope (b) Pride (c) Gratitude (d) Surprise (e) Relief

_____23. Kevin has been working at his current job for a few years. Out of the blue, he finds that he will receive a promotion. *Kevin is most likely to feel?*
(a) Pride (b) Relief (c) Joy (d) Hope (e) Guilt

_____24. By their own actions, a person reaches a goal they wanted to reach. *The person is most likely to feel?*
(a) Joy (b) Hope (c) Relief (d) Pride (e) Surprise

_____25. An unwanted situation becomes less likely or stops altogether. *The person involved is most likely to feel?*
(a) Regret (b) Hope (c) Joy (d) Sadness (e) Relief

_____26. Hasad tries to use his new mobile phone. He has always been able to work out how to use different appliances, but he cannot get the phone to function. *Hasad is most likely to feel?*
(a) Distressed (b) Confused (c) Surprised (d) Relieved (e) Frustrated

_____27. Dorian's friend is ill and coughs all over him without bothering to turn away or cover his mouth. *Dorian is most likely to feel?*
(a) Anxiety (b) Dislike (c) Surprise (d) Jealousy (e) Rage

_____28. Although she has been careful to avoid all risk factors, Tina has contracted cancer. There is only a small chance that the cancer will be benign and nothing Tina does now can make a difference. *Tina is most likely to feel?*
(a) Scared (b) Distressed (c) Irritated (d) Sad (e) Hopeful

_____29. Adam and his wife are talking about what happened to them that day. Something happened that caused Adam to feel surprised. *What is most likely to have happened?*
(a) His wife talked a lot, which did not usually happen.
(b) His wife talked about things that were different to what they usually discussed.
(c) His wife told him that she might have some bad news.
(d) His wife told Adam some news that was not what he thought it would be.
(e) His wife told a funny story.

_____30. An upcoming event might have bad consequences. Nothing much can be done to alter this. *The person involved would be most likely to feel?*
(a) Sad (b) Irritated (c) Distressed (d) Scared (e) Hopeful

_____31. It is clear that somebody will get what they want. *They are most likely to feel?*
(a) Pride (b) Relief (c) Joy (d) Hope (e) Guilt

_____32. By chance, a situation arises where there is the possibility that a person will get what they want. *The person is most likely to feel?*
(a) Distress (b) Hope (c) Surprise (d) Joy (e) Fear

_____33. A supervisor who is unpleasant to work for leaves Alfonso's work. *Alfonso is most likely to feel?*
(a) Joy (b) Hope (c) Regret (d) Relief (e) Sadness

_____34. The nature of Sara's job changes due to unpredictable factors and she no longer gets to do the portions of her work that she most enjoyed. *Sara is most likely to feel?*
(a) Ashamed (b) Sad (c) Angry (d) Distressed (e) Frustrated

_____35. Leila has been unable to sleep well lately and there are no changes in her life that might indicate why. *Leila is most likely to feel?*
(a) Angry (b) Scared (c) Sad (d) Distressed (e) Guilty

_____36. A person feels they have control over a situation. The situation turns out badly for no particular reason. *The person involved is most likely to feel?*
(a) Confused (b) Relieved (c) Surprised (d) Frustrated (e) Distressed

_____37. Someone believes another person has deliberately caused something good to stop happening to them. However, they feel they can do something about it. *They are most likely to feel?*
(a) Angry (b) Contemptuous (c) Distress (d) Depressed (e) Frustrated

_____38. The new manager at Enid's work changes everyone's hours to a less flexible work pattern, leaving no room for discussion. *Enid is most likely to feel?*
(a) Dislike (b) Rage (c) Jealousy (d) Surprise (e) Anxiety

_____39. Someone believes that another person has caused harm to them, due to that person's bad character. They think they can probably handle the situation though. *The harmed person is most likely to feel?*
(a) Contempt (b) Anger (c) Horror (d) Excitement (e) Shame

_____40. Pete gets home late, after his favorite TV show has ended. Pete's partner has taped the show for him. *Pete is most likely to feel?*
(a) Surprise (b) Hope (c) Pride (d) Relief (e) Gratitude

_____41. Matthew has been at his current job for six months. Something happened that caused him to feel regret. *What is most likely to have happened?*
(a) He did not apply for a position he wanted, and has found out that someone else less qualified got the job.
(b) He did not apply for a position he wanted, and has started looking for a similar position.
(c) He found out that opportunities for promotion have dried up.
(d) He found out that he didn't get a position he thought he would get.
(e) He didn't hear about a position he could have applied for and now it is too late.

_____42. Penny's hockey team trained hard and won the championship. *Penny is most likely to feel?*
(a) Hope (b) Pride (c) Relief (d) Joy (e) Surprise

Instructions: In this test, you will be presented with a few brief details about an emotional situation, and asked to choose from four responses the most effective course of action to manage <u>both</u> the <u>emotions the person is feeling</u> and the <u>problems they face</u> in that situation.

Although more than one course of action might be acceptable, you are asked to choose what you think the <u>most</u> effective response for that person in that situation would be.

Remember, you are not necessarily choosing what you would do, or the nicest thing to do, but choosing the <u>most effective response</u> for that situation.

1. Lee's workmate fails to deliver an important piece of information on time, causing Lee to fall behind schedule also. *What action would be the most effective for Lee?*
    (a) Explain the urgency of the situation to the workmate.
    (b) Never rely on that workmate again.
    (c) Get angry with the workmate.
    (d) Work harder to compensate.

2. Rhea has left her job to be a full-time mother, which she loves, but she misses the company and companionship of her workmates. *What action would be the most effective for Rhea?*
    (a) Try to see her old workmates socially, inviting them for coffee or dinner.
    (b) Join a playgroup or social group of new mothers.
    (c) See if she can find part time work.
    (d) Enjoy being a full-time mom.

3. Pete has specific skills his workmates do not and he feels that his workload is higher because of it. *What action would be the most effective for Pete?*
    (a) Speak to his boss about this.
    (b) Start looking for a new job.
    (c) Be very proud of his unique skills.
    (d) Speak to his workmates about this.

4. Martina and Connie have shared an office for years but Martina gets a new job and Connie loses contact with her. *What action would be the most effective for Connie?*
    (a) Contact Martina and arrange to catch up but also make friends with her replacement.
    (b) Call Martina and ask her out for lunch or coffee to catch up.
    (c) Spend time getting to know the other people in the office, and strike up new friendships.
    (d) Just accept that she is gone and the friendship is over.

5. Manuel is only a few years from retirement when he finds out his position will no longer exist, although he will still have a job with a less prestigious role. *What action would be the most effective for Manuel?*
    (a) Talk to his boss or the management about it.
    (b) Carefully consider his options and discuss it with his family.
    (c) Walk out of that job.
    (d) Accept the situation, but still feel bitter about it.

6. Alan helps Trudy, a peer he works with occasionally, with a difficult task. Trudy complains that Alan's work isn't very good, and Alan responds that Trudy should be grateful he is doing her a favor. They argue. *What action would be the most effective for Alan?*
    (a) Apologize to Trudy.
    (b) Stop helping Trudy and don't help her again.
    (c) Try harder to help appropriately.
    (d) Diffuse the argument by asking for advice.

7. Mario starts a new job where he doesn't know anyone and finds that no one is particularly friendly. *What action would be the most effective for Mario?*
    (a) Make an effort to talk to people and be friendly himself.
    (b) Have fun with his friends outside of work hours.
    (c) Concentrate on doing his work well at the new job.
    (d) Leave the job and find one with a better environment.

8. Darla is nervous about presenting her work to a group of seniors who might not understand it, as they don't know much about her area. *What action would be the most effective for Darla?*
    (a) Work on her presentation, simplifying the explanations.
    (b) Practice presenting to laypeople such as friends or family.
    (c) Just give the presentation.
    (d) Be positive and confident, knowing it will go well.

9. Andre moves away from the city his friends and family are in. He finds his friends make less effort to keep in contact than he thought they would. *What action would be the most effective for Andre?*
    (a) He should make the effort to contact them, but also try to meet people in his new city.
    (b) Try to adjust to life in the new city by joining clubs and activities there.
    (c) Let go of his old friends, who have shown themselves to be unreliable.
    (d) Tell his friends he is disappointed in them for not contacting him.

10. Helga's team has been performing very well. They receive poor-quality work from another team that they must incorporate into their own project. *What action would be the most effective for Helga?*
    (a) Tell the other team they must re-do their work.
    (b) Don't worry about it.
    (c) Tell the project manager about the situation.
    (d) Re-do the other team's work to get it up to par.

11. Clayton has been overseas for a long time and returns to visit his family. So much has changed that Clayton feels left out. *What action would be the most effective for Clayton?*
    (a) Spend time listening and getting involved again.
    (b) Reflect that things can change with time.
    (c) Nothing – it will sort itself out soon enough.
    (d) Tell his family he feels left out.

12. Daniel has been accepted for a prestigious position in a different country from his family, who he is close to. He and his wife decide it is worth relocating. *What action would be the most effective for Daniel?*
(a) Set up a system for staying in touch, like weekly phone calls or emails.
(b) Think about the great opportunities this change offers.
(c) Don't take the position
(d) Realize he shouldn't have applied for the job if he didn't want to leave.

13. A junior employee is making routine adjustments to some of Max's equipment and accuses Max of causing the equipment malfunction. *What action would be the most effective for Max?*
(a) Ignore the accusation, it is not important.
(b) Explain that malfunctions were not his fault.
(c) Learn more about using the equipment so that it doesn't break.
(d) Reprimand the employee for making such accusations.

14. Katerina answers the phone and hears that close relatives are in hospital critically ill. *What action would be the most effective for Katerina?*
(a) Speak to other family members to calm herself and find out what is happening, then visit the hospital.
(b) Visit the hospital and ask staff about their condition.
(c) Let herself cry and express emotion for as long as she feels like.
(d) There is nothing she can do.

15. Upon entering full-time study, Vincent cannot afford the time or money he used to spend on water polo training, which he was quite good at. Although he enjoys full-time study, he misses training. *What action would be the most effective for Vincent?*
(a) See if there is a local league or a less expensive time-consuming sport.
(b) Find out about sporting scholarships or grants.
(c) Think deeply about whether sport or study is more important to him.
(d) Concentrate on studying hard, to pass his course.

16. Greg has just gone back to university after a lapse of several years. He is surrounded by younger students who seem very confident about their ability and he is unsure whether he can compete with them. *What action would be the most effective for Greg?*
(a) Talk to others in his situation.
(b) Study hard and attend all lectures.
(c) Realize he is better than the younger students as he has more life experience.
(d) Focus on his life outside the university.

17. Celia has not spoken to her nephew for months, whereas when he was younger they were very close. She calls him but he can only talk for five minutes. *What action would be the most effective for Celia?*
(a) Understand that relationships change, but keep calling him from time to time.
(b) Make plans to drop by and visit him in person and have a good chat.
(c) Realize that he is growing up and might not want to spend so much time with his family any more.
[d] Be upset about it, but realize there is nothing she can do.

18. Joel has always dealt with one particular client but on a very complex job his boss gives the task to a co-worker instead. Joel wonders whether his boss thinks he can't handle the important jobs. *What action would be the most effective for Joel?*
(a) Ask his boss why the co-worker was given the job.
(b) Do good work so that he will be given the complex tasks in future.
(c) Not worry about this unless it happens again.
(d) Believe he is performing well and will be given the next complex job.

19. Gloria is overseas when she finds out that her father has passed away from an illness he has had for years. *What action would be the most effective for Gloria?*
(a) Contact her close relatives for information and support.
(b) Try not to think about it, going on with her daily life as best she can.
(c) Think deeply about the more profound meaning of this loss.
(d) Feel terrible that she left the country at such a time.

20. Jane and her sister-in-law normally get along quite well, and the sister-in-law regularly babysits for her for a small fee. Lately she has also been cleaning away cobwebs, commenting on the mess, which Jane finds insulting. *What action would be the most effective for Jane?*
(a) Tell her sister-in-law these comments upset her.
(b) Tell her only to babysit, not to clean.
(c) Be grateful her house is being cleaned for free.
(d) Get a new babysitter.

21. Jerry is fairly sure his company is going down and his job is under threat. It is a large company and nothing official has been said. *What action would be the most effective for Jerry?*
(a) Start applying for other jobs.
(b) Find out what is happening and discuss his concerns with his family.
(c) Try to keep the company afloat by working harder.
(d) Think of these events as an opportunity for a new start.

22. Mallory moves from a small company to a very large one, where there is little personal contact, which she misses. *What action would be the most effective for Mallory?*
(a) Talk to her workmates, try to create social contacts and make friends
(b) Concentrate on her outside-work friends and colleagues from previous jobs.
(c) Start looking for a new job so she can leave that environment.
(d) Just give it time, and things will be okay.

23. A demanding client takes up a lot of Jill's time and then asks to speak to Jill's boss about her performance. Although Jill's boss assures her that her performance is fine, Jill feels upset. *What action would be the most effective for Jill?*
(a) Calm down by taking deep breaths or going for a short walk.
(b) Think that she has been successful in the past and this client being difficult is not her fault.
(c) Talk to her friends or workmates about it.
(d) Ignore the incident and move on to her next task.

24. Blair and Flynn usually go to a cafe after the working week and chat about what's going on in the company. After Blair's job is moved to a different section in the company, he stops coming to the cafe. Flynn misses these Friday talks. *What action would be the most effective for Flynn?*
(a) Invite Blair again, maybe rescheduling for another time.
(b) Go to the cafe or socialize with other workers.
(c) Don't worry about it, ignore the changes and let Blair be.
(d) Not talk to Blair again.

25. Michelle's friend Erin is moving overseas to live with her partner. They have been good friends for many years and Erin is unlikely to come back. *What action would be the most effective for Michelle?*
(a) Make sure she keeps in contact through email, phone or letter writing.
(b) Spend time with other friends, and keep busy.
(c) Think that Erin and her partner will return soon.
(d) Forget about Erin.

26. Dorian needs to have some prostate surgery and is quite scared about the process. He has heard that it is quite painful. *What action would be the most effective for Dorian?*
(a) Find out as much as he can about the procedure and focus on calming down.
(b) Talk to his family about his concerns.
(c) Talk to his doctor about what will happen.
(d) Keep busy in the meantime so he doesn't think about the impending surgery.

27. Hannah's access to essential resources has been delayed and her work is way behind schedule. Her progress report makes no mention of the lack of resources. *What action would be the most effective for Hannah?*
(a) Explain the lack of resources to her boss or to management.
(b) Document the lack of resources in her progress report.
(c) Learn that she should plan ahead for next time.
(d) Don't worry about it.

28. Alana has been acting in a high-ranking role for several months. A decision is made that only long-term employees can now act in these roles, and Alana has not been with the company long enough to do so. *What action would be the most effective for Alana?*
(a) Ask management if an exception can be made.
(b) Accept this new rule, but feel snubbed.
(c) Quit that position.
(d) Use that experience to get promoted when she is long term.

29. Jacob is having a large family gathering to celebrate moving into his new home. He wants the day to go smoothly and is a little nervous about it. *What action would be the most effective for Jacob?*
(a) Prepare ahead of time so he has everything he needs available.
(b) Talk to friends or relatives to ease his worries.
(c) Try to calm down, perhaps go for a short walk or meditate.
(d) Accept that things aren't going to be perfect but the family will understand.

30. Julie hasn't seen Kathy for ages and looks forward to their weekend trip away. However, Kathy has changed a lot and Julie finds that she is no longer an interesting companion. *What action would be the most effective for Julie?*
(a) Understand that people change, so move on, but remember the good times.
(b) Realize that it is time to give up the friendship and move on.
(c) Cancel the trip and go home
(d) Concentrate on her other, more rewarding friendships.

Appendix E—Letter Series (LS)

Example 1:   A B C D E F ?

Example 2:   U V W X Y Z ?

TEST ITEMS:

Item 1:   J K L M N O P Q ?

Item 2:   C C Z C C Y C C X C C ?

Item 3:   P Q Q R R R S S S S ?

Item 4:   T R A T R B T R C T R ?

Item 5:   B C C D E E F G ?

Item 6:   O P Q O P Q R S T R S T U ?

Item 7:   L O M P N ?

Item 8:   A D G B E H C F ?

Item 9:   A X A Y B X B Y C X C Y ?

Item 10:   A M B C M D E F M G H I J ?

Item 11:   A B C R S T D E F Q R S G H I ?

Item 12:   R C R C S T C T U C ?

Item 13:   Z A X Z Z X Z Y X Z X X Z ?

Item 14:   C E B D A C Z B ?

Item 15:   X F H Z J L B N P ?

Appendix F—Esoteric Analogies (EA)

Example:

LIGHT is to DARK as HAPPY is to   **GLAD   SAD   GAY   EAGER**

1. FIRE is to HOT as ICE is to   POLE   COLD   CREAM   WHITE

2. LOVE is to HATE as FRIEND is to   LOVER   PAL   OBEY   ENEMY

3. STATUE is to SHAPE as SONG is to   BEAUTY   PIANO   TUNE   NOTE

4. GROUND is to FOOT as RAIL is to   WHEEL   TRAIN   IRON   STATION

5. FLAME is to HEAT as ROSE is to   LEAVES   SCENT   THORN   PETALS

6. SPACE is to POINT as TIME is   CLOCK   ETERNAL   MOMENT   POTION

7. RAIN is to HAIL as DEW is to   SNOW   WATER   CLOUD   FROST

8. MANY is to FEW as OFTEN is to   FREQUENT   NEVER   ALWAYS   SELDOM

9. BETTER is to WORST as SLOWER is to   FAST   RAPID   QUICKEST   BEST

10. SURPRISE is to STRANGE as FEAR is to   ANXIOUS   TERRIBLE   WEAK   QUICK

11. SOON is to NEVER as NEAR is to   NOWHERE   FAR   AWAY   SOMEWHERE

12. WIN is to JOY as LOSE is to   FUN   SADNESS   FAIL   DREAM

13. FOX is to WOLF as GOAT is to   DOG   SHEEP   TIGER   RAT

14. GANDER is to GOOSE as HOG is to   COW   ROOT   SOW   PIG

15. MAP is to GEOGRAPHY as BLUEPRINT is to   HOUSE   ARCHITECTURE   FOUNDATION   GEOLOGY

16. FORE is to AFT as BOW is to   STERN   DECK   BOAT   ARROW

17. HOMICIDE is to LAW as OEDEMA is to   ACTING   PEDAGOGY   THEOLOGY   MEDICINE

18. CAT is to FELINE as HORSE is to   CANINE   VULPINE   EQUINE   CARNIVORE

19. THREE is to TRIANGLE as FIVE is to   HEXAGON   PENTAGON   CIRCLE   TRAPEZOID

20. ARMADILLO is to ANIMAL as CHARD is to   VEGETABLE   DRINK   FISH   LIZARD

21. CONSTELLATION is to STAR as ARCHIPELAGO is to   PENINSULAR   ISLAND   CONTINENT   COUNTRY

22. LENORE is to POE as ALICE is to   WHITMAN   SHAKESPEARE   CARROL   BYRON

23. GUSTATORY is to TASTE as OLFACTORY is to   TOUCH   SMELL   FEEL   BALANCE

24. VIRGIL is to AENID as MATTHEW is to   PSALMS   MARK   GOSPEL   JESUS

STOP. THAT IS THE END OF THIS TEST.

How Accurately Can You Describe Yourself?

Please use this list of common human traits to describe yourself as accurately as possible.
Describe yourself as you see yourself at the present time, not as you wish to be in the future.
Describe yourself as you are generally or typically, as compared with other persons you know
of the same sex and of roughly your same age.

For each question, ask yourself: "does this word apply to me"? Then CIRCLE a number to
indicate how accurately each adjective describes you, using the following rating scale:

1 Extremely Inaccurate (does not apply at all)	2 Very Inaccurate	3 Moderately Inaccurate	4 Slightly Inaccurate	5 Neither Accurate nor Inaccurate (or unsure)	6 Slightly Accurate	7 Moderately Accurate	8 Very Accurate	9 Extremely Accurate (applies very strongly)

Trait	Scale		Trait	Scale
Bashful	1 2 3 4 5 6 7 8 9		Energetic	1 2 3 4 5 6 7 8 9
Moody	1 2 3 4 5 6 7 8 9		Systematic	1 2 3 4 5 6 7 8 9
Bold	1 2 3 4 5 6 7 8 9		Envious	1 2 3 4 5 6 7 8 9
Organized	1 2 3 4 5 6 7 8 9		Talkative	1 2 3 4 5 6 7 8 9
Careless	1 2 3 4 5 6 7 8 9		Extraverted	1 2 3 4 5 6 7 8 9
Philosophical	1 2 3 4 5 6 7 8 9		Temperamental	1 2 3 4 5 6 7 8 9
Cold	1 2 3 4 5 6 7 8 9		Fretful	1 2 3 4 5 6 7 8 9
Practical	1 2 3 4 5 6 7 8 9		Touchy	1 2 3 4 5 6 7 8 9
Complex	1 2 3 4 5 6 7 8 9		Harsh	1 2 3 4 5 6 7 8 9
Quiet	1 2 3 4 5 6 7 8 9		Uncreative	1 2 3 4 5 6 7 8 9
Cooperative	1 2 3 4 5 6 7 8 9		Imaginative	1 2 3 4 5 6 7 8 9
Relaxed	1 2 3 4 5 6 7 8 9		Unenvious	1 2 3 4 5 6 7 8 9
Creative	1 2 3 4 5 6 7 8 9		Inefficient	1 2 3 4 5 6 7 8 9
Rude	1 2 3 4 5 6 7 8 9		Unintellectual	1 2 3 4 5 6 7 8 9
Deep	1 2 3 4 5 6 7 8 9		Intellectual	1 2 3 4 5 6 7 8 9
Shy	1 2 3 4 5 6 7 8 9		Unsympathetic	1 2 3 4 5 6 7 8 9
Disorganized	1 2 3 4 5 6 7 8 9		Jealous	1 2 3 4 5 6 7 8 9
Sloppy	1 2 3 4 5 6 7 8 9		Warm	1 2 3 4 5 6 7 8 9
Efficient	1 2 3 4 5 6 7 8 9		Kind	1 2 3 4 5 6 7 8 9
Sympathetic	1 2 3 4 5 6 7 8 9		Withdrawn	1 2 3 4 5 6 7 8 9

Appendix H—Teamwork Assessment

*WHAT ARE YOUR VIEWS ABOUT **TEAMWORK**?*

DIRECTIONS:

Below, you will find a number of statements that you should read and decide how well each
one of them describes the way you think or feel. For each item, circle the number that
corresponds to your answer.

You should reply to all statements. Give your first impression of whether each statement
describes the way you think and feel about it. Don't spend too long on deciding what your
answer should be. Answer all statements even if you're not entirely sure of your answer.
There are NO right or wrong answers.

Items	**Never**	**Rarely**	**Sometimes**	**Often**	**Usually**	**Always**
1. I respect the opinion of my peers.	1	2	3	4	5	6
2. I know how to make other students see things my way.	1	2	3	4	5	6
3. I take other students' interests into account.	1	2	3	4	5	6
4. My arguments are constructive.	1	2	3	4	5	6
5. I seek to influence my peers.	1	2	3	4	5	6
6. I understand that each team member is different.	1	2	3	4	5	6
7. I am flexible in team situations.	1	2	3	4	5	6
8. I am a good listener.	1	2	3	4	5	6
9. I am open to varying opinions.	1	2	3	4	5	6
10. I carefully consider the facts to persuade my peers.	1	2	3	4	5	6
11. I adapt to change well.	1	2	3	4	5	6
12. I like to be in charge of groups or projects.	1	2	3	4	5	6
13. I acknowledge the accomplishments of my peers.	1	2	3	4	5	6
14. I enjoy helping team members.	1	2	3	4	5	6
15. I cooperate with other students.	1	2	3	4	5	6
16. I believe that there is only one "best" solution.	1	2	3	4	5	6
17. I am comfortable providing constructive criticism.	1	2	3	4	5	6
18. I dislike it when people challenge my views.	1	2	3	4	5	6
19. I like team activities.	1	2	3	4	5	6

20.	I suggest alternative solutions to problems.	1	2	3	4	5	6
21.	I contribute to the definition of a team's goals.	1	2	3	4	5	6
22.	I enjoy bringing team members together.	1	2	3	4	5	6
23.	I consider team members first.	1	2	3	4	5	6
24.	I share ideas with others to accomplish a task.	1	2	3	4	5	6
25.	I believe I am a good leader.	1	2	3	4	5	6
26.	I can convince my peers about anything.	1	2	3	4	5	6
27.	I provide appropriate feedback to team members.	1	2	3	4	5	6
28.	I value different perspective to help me strength my understandings of issues or problems.	1	2	3	4	5	6
29.	I think that exchange of ideas among team members can lead to creative solutions.	1	2	3	4	5	6
30.	I am inspired by others' ideas and thoughts.	1	2	3	4	5	6

Appendix I—Pre-Task State Questionnaire

General Instructions. This questionnaire is concerned with your feelings and thoughts at the moment. We would like to build up a detailed picture of your current state of mind, so there are quite a few questions, divided into four sections. Please answer **every** question, even if you find it difficult. Answer, as honestly as you can, what is true of **you**. Please do not choose a reply just because it seems like the 'right thing to say'. Your answers will be kept entirely confidential. Also, be sure to answer according to how you feel **AT THE MOMENT**. Don't just put down how you usually feel. You should try and work quite quickly: there is no need to think very hard about the answers. The first answer you think of is usually the best.

Before you start, please provide some general information about yourself.

Age............. (years)   Sex. M F (Circle one)
Occupation...
If student, state your course..................................
Date today.....................   Time of day now..............

First, there is a list of words which describe people's moods or feelings. Please indicate how well each word describes how you feel **AT THE MOMENT**. For each word, circle the answer from 1 to 4 which best describes your mood.

1. MOOD STATE				
	Definitely	Slightly	Slightly Not	Definitely Not
1. Happy	1	2	3	4
2. Dissatisfied	1	2	3	4
3. Energetic	1	2	3	4
4. Relaxed	1	2	3	4
5. Alert	1	2	3	4
6. Nervous	1	2	3	4
7. Passive	1	2	3	4
8. Cheerful	1	2	3	4
9. Tense	1	2	3	4
10. Jittery	1	2	3	4
11. Sluggish	1	2	3	4
12. Sorry	1	2	3	4
13. Composed	1	2	3	4
14. Depressed	1	2	3	4
15. Restful	1	2	3	4
16. Vigorous	1	2	3	4
17. Anxious	1	2	3	4
18. Satisfied	1	2	3	4
19. Unenterprising	1	2	3	4
20. Sad	1	2	3	4
21. Calm	1	2	3	4
22. Active	1	2	3	4
23. Contented	1	2	3	4
24. Tired	1	2	3	4
25. Impatient	1	2	3	4
26. Annoyed	1	2	3	4
27. Angry	1	2	3	4
28. Irritated	1	2	3	4
29. Grouchy	1	2	3	4

Please answer some questions about your attitude to the task you are about to do. Rate your agreement with the following statements by circling one of the following answers:

Extremely = 4   Very much = 3   Somewhat = 2   A little bit = 1   Not at all = 0

2. MOTIVATION					
1. I expect the content of the task will be interesting	0	1	2	3	4
2. The only reason to do the task is to get an external reward (e.g. payment)	0	1	2	3	4
3. I would rather spend the time doing the task on something else	0	1	2	3	4
4. I am concerned about not doing as well as I can	0	1	2	3	4
5. I want to perform better than most people do	0	1	2	3	4
6. I will become fed up with the task	0	1	2	3	4
7. I am eager to do well	0	1	2	3	4
8. I would be disappointed if I failed to do well on the task	0	1	2	3	4
9. I am committed to attaining my performance goals	0	1	2	3	4
10. Doing the task is worthwhile	0	1	2	3	4
11. I expect to find the task boring	0	1	2	3	4
12. I feel apathetic about my performance	0	1	2	3	4
13. I want to succeed on the task	0	1	2	3	4
14. The task will bring out my competitive drives	0	1	2	3	4
15. I am motivated to do the task	0	1	2	3	4

In this section, we are concerned with your thoughts about yourself: how your mind is working, how confident you feel, and how well you expect to perform on the task. Below are some statements which may describe your style of thought **RIGHT NOW**. Read each one carefully and indicate how true each statement is of your thoughts **AT THE MOMENT**. To answer, circle one of the following answers:

Extremely = 4   Very much = 3   Somewhat = 2   A little bit = 1   Not at all = 0

3. THINKING STYLE					
1. I'm trying to figure myself out.	0	1	2	3	4
2. I'm very aware of myself.	0	1	2	3	4
3. I'm reflecting about myself.	0	1	2	3	4
4. I'm daydreaming about myself.	0	1	2	3	4
5. I'm thinking deeply about myself.	0	1	2	3	4
6. I'm attending to my inner feelings.	0	1	2	3	4
7. I'm examining my motives.	0	1	2	3	4
8. I feel that I'm off somewhere watching myself.	0	1	2	3	4
9. I feel confident about my abilities.	0	1	2	3	4
10. I am worried about whether I am regarded as a success or failure.	0	1	2	3	4
11. I feel self-conscious.	0	1	2	3	4
12. I feel as smart as others.	0	1	2	3	4
13. I am worried about what other people think of me.	0	1	2	3	4
14. I feel confident that I understand things.	0	1	2	3	4
15. I feel inferior to others at this moment.	0	1	2	3	4
16. I feel concerned about the impression I am making.	0	1	2	3	4
17. I feel that I have less scholastic ability right now than others.	0	1	2	3	4
18. I am worried about looking foolish.	0	1	2	3	4
19. My attention is directed towards things other than the task.	0	1	2	3	4
20. I am finding physical sensations such as muscular tension distracting.	0	1	2	3	4
21. I expect my performance will be impaired by thoughts irrelevant to the task.	0	1	2	3	4
22. I have too much to think about to be able to concentrate on the task.	0	1	2	3	4
23. My thinking is generally clear and sharp.	0	1	2	3	4
24. I will find it hard to maintain my concentration for more than a short time.	0	1	2	3	4
25. My mind is wandering a great deal.	0	1	2	3	4
26. My thoughts are confused and difficult to control.	0	1	2	3	4
27. I expect to perform proficiently on this task.	0	1	2	3	4
28. Generally, I feel in control of things.	0	1	2	3	4
29. I can handle any difficulties I encounter	0	1	2	3	4
30. I consider myself skillful at the task	0	1	2	3	4

This set of questions concerns the kinds of thoughts that go through people's heads at particular times, for example while they are doing some task or activity. Below is a list of thoughts, some of which you might have had recently. Please indicate roughly how often you had each thought **DURING THE LAST TEN MINUTES** or so, by circling a number from the list below.

1= Never   2= Once   3= A few times   4= Often   5= Very often

4. THINKING CONTENT					
1. I thought about how I should work more carefully.	1	2	3	4	5
2. I thought about how much time I had left.	1	2	3	4	5
3. I thought about how others have done on this task.	1	2	3	4	5
4. I thought about the difficulty of the problems.	1	2	3	4	5
5. I thought about my level of ability.	1	2	3	4	5
6. I thought about the purpose of the experiment.	1	2	3	4	5
7. I thought about how I would feel if I were told how I performed.	1	2	3	4	5
8. I thought about how often I get confused.	1	2	3	4	5
9. I thought about members of my family.	1	2	3	4	5
10. I thought about something that made me feel guilty.	1	2	3	4	5
11. I thought about personal worries.	1	2	3	4	5
12. I thought about something that made me feel angry.	1	2	3	4	5
13. I thought about something that happened earlier today.	1	2	3	4	5
14. I thought about something that happened in the recent past (last few days, but not today).	1	2	3	4	5
15. I thought about something that happened in the distant past	1	2	3	4	5
16. I thought about something that might happen in the future.	1	2	3	4	5

General Instructions

This questionnaire is concerned with your feelings and thoughts while you were performing the task. We would like to build up a detailed picture of your current state of mind, so there are quite a few questions, divided into four sections. Please answer every question, even if you find it difficult. Answer, as honestly as you can, what is true of you. Please do not choose a reply just because it seems like the 'right thing to say'. Your answers will be kept entirely confidential. Also, be sure to answer according to how you felt **WHILE PERFORMING THE TASK**. Don't just put down how you usually feel. You should try and work quite quickly: there is no need to think very hard about the answers. The first answer you think of is usually the best.

First, there is a list of words which describe people's moods or feelings. Please indicate how well each word describes how you felt **WHILE PERFORMING THE TASK**. For each word, circle the answer from 1 to 4 which best describes your mood.

1. MOOD STATE				
	Definitely	Slightly	Slightly Not	Definitely Not
1. Happy	1	2	3	4
2. Dissatisfied	1	2	3	4
3. Energetic	1	2	3	4
4. Relaxed	1	2	3	4
5. Alert	1	2	3	4
6. Nervous	1	2	3	4
7. Passive	1	2	3	4
8. Cheerful	1	2	3	4
9. Tense	1	2	3	4
10. Jittery	1	2	3	4
11. Sluggish	1	2	3	4
12. Sorry	1	2	3	4
13. Composed	1	2	3	4
14. Depressed	1	2	3	4
15. Restful	1	2	3	4
16. Vigorous	1	2	3	4
17. Anxious	1	2	3	4
18. Satisfied	1	2	3	4
19. Unenterprising	1	2	3	4
20. Sad	1	2	3	4
21. Calm	1	2	3	4
22. Active	1	2	3	4
23. Contented	1	2	3	4
24. Tired	1	2	3	4
25. Impatient	1	2	3	4
26. Annoyed	1	2	3	4
27. Angry	1	2	3	4
28. Irritated	1	2	3	4
29. Grouchy	1	2	3	4

Please answer the following questions about your attitude **to the task you have just done**. Rate your agreement with the following statements by circling one of the following answers:

Extremely = 4   Very much = 3   Somewhat = 2   A little bit = 1   Not at all = 0

2. MOTIVATION AND WORKLOAD					
1. The content of the task was interesting	0	1	2	3	4
2. The only reason to do the task is to get an external reward (e.g. payment)	0	1	2	3	4
3. I would rather have spent the time doing the task on something else	0	1	2	3	4
4. I was concerned about not doing as well as I can	0	1	2	3	4
5. I wanted to perform better than most people do	0	1	2	3	4
6. I became fed up with the task	0	1	2	3	4
7. I was eager to do well	0	1	2	3	4
8. I would be disappointed if I failed to do well on this task	0	1	2	3	4
9. I was committed to attaining my performance goals	0	1	2	3	4
10. Doing the task was worthwhile	0	1	2	3	4
11. I found the task boring	0	1	2	3	4
12. I felt apathetic about my performance	0	1	2	3	4
13. I wanted to succeed on the task	0	1	2	3	4
14. The task brought out my competitive drives	0	1	2	3	4
15. I was motivated to do the task	0	1	2	3	4

16. Please rate the MENTAL DEMAND of the task: How much mental and perceptual activity was required?

low									high
1	2	3	4	5	6	7	8	9	10

17. Please rate the PHYSICAL DEMAND of the task: How much physical activity was required?

low									high
1	2	3	4	5	6	7	8	9	10

18. Please rate the TEMPORAL DEMAND of the task: How much time pressure did you feel due to the pace at which the task elements occurred?

low									high
1	2	3	4	5	6	7	8	9	10

19. Please rate your PERFORMANCE: How successful do you think you were in accomplishing the goals of the task?

low									high
1	2	3	4	5	6	7	8	9	10

20. Please rate your EFFORT: How hard did you have to work (mentally and physically) to accomplish your level of performance?

low									high
1	2	3	4	5	6	7	8	9	10

21. Please rate your FRUSTRATION: How discouraged, irritated, stressed and annoyed did you feel during the task?

low									high
1	2	3	4	5	6	7	8	9	10

In this section, we are concerned with your thoughts about yourself: how your mind is working, how confident you feel, and how well you believed you performed on the task. Below are some statements which may describe your style of thought during task performance. Read each one carefully and indicate how true each statement was of your thoughts **WHILE PERFORMING THE TASK**. To answer circle one of the following answers:

Extremely = 4   Very much = 3   Somewhat = 2   A little bit = 1   Not at all = 0

3. THINKING STYLE					
1. I tried to figure myself out.	0	1	2	3	4
2. I was very aware of myself.	0	1	2	3	4
3. I reflected about myself.	0	1	2	3	4
4. I daydreamed about myself.	0	1	2	3	4
5. I thought deeply about myself.	0	1	2	3	4
6. I attended to my inner feelings.	0	1	2	3	4
7. I examined my motives.	0	1	2	3	4
8. I felt that I was off somewhere watching myself.	0	1	2	3	4
9. I felt confident about my abilities.	0	1	2	3	4
10. I was worried about whether I am regarded as a success or failure.	0	1	2	3	4
11. I felt self-conscious.	0	1	2	3	4
12. I felt as smart as others.	0	1	2	3	4
13. I was worried about what other people think of me.	0	1	2	3	4
14. I felt confident that I understood things.	0	1	2	3	4
15. I felt inferior to others.	0	1	2	3	4
16. I felt concerned about the impression I was making.	0	1	2	3	4
17. I felt that I had less scholastic ability than others.	0	1	2	3	4
18. I was worried about looking foolish.	0	1	2	3	4
19. My attention was directed towards things other than the task.	0	1	2	3	4
20. I found physical sensations such as muscular tension distracting.	0	1	2	3	4
21. My performance was impaired by thoughts irrelevant to the task.	0	1	2	3	4
22. I had too much to think about to be able to concentrate on the task.	0	1	2	3	4
23. My thinking was generally clear and sharp.	0	1	2	3	4
24. I found it hard to maintain my concentration for more than a short time.	0	1	2	3	4
25. My mind wandered a great deal.	0	1	2	3	4
26. My thoughts were confused and difficult to control	0	1	2	3	4
27. I performed proficiently on this task.	0	1	2	3	4
28. Generally, I felt in control of things.	0	1	2	3	4
29. I was able to handle any difficulties I encountered	0	1	2	3	4
30. I consider myself skillful at the task	0	1	2	3	4

This set of questions concerns the kinds of thoughts that go through people's heads at particular times, for example while they are doing some task or activity. Below is a list of thoughts, some of which you might have had recently. Please indicate roughly how often you had each thought during **THE LAST TEN MINUTES** (while performing the task), by circling a number from the list below.

1= Never   2= Once   3= A few times   4= Often   5= Very often

4. THINKING CONTENT					
1. I thought about how I should work more carefully.	1	2	3	4	5
2. I thought about how much time I had left.	1	2	3	4	5
3. I thought about how others have done on this task.	1	2	3	4	5
4. I thought about the difficulty of the problems.	1	2	3	4	5
5. I thought about my level of ability.	1	2	3	4	5
6. I thought about the purpose of the experiment.	1	2	3	4	5
7. I thought about how I would feel if I were told how I performed.	1	2	3	4	5
8. I thought about how often I get confused.	1	2	3	4	5
9. I thought about members of my family.	1	2	3	4	5
10. I thought about something that made me feel guilty.	1	2	3	4	5
11. I thought about personal worries.	1	2	3	4	5
12. I thought about something that made me feel angry.	1	2	3	4	5
13. I thought about something that happened earlier today.	1	2	3	4	5
14. I thought about something that happened in the recent past (last few days, but not today).	1	2	3	4	5
15. I thought about something that happened in the distant past	1	2	3	4	5
16. I thought about something that might happen in the future.	1	2	3	4	5

Next, please answer some questions about the task. Please indicate what you thought of the task while you were performing it. Please try to rate the task itself rather than your personal reactions to it. For each adjective or sentence circle the appropriate number, on the six point scales provided (where 0 = not at all to 5 = very much so).

Threatening	0	1	2	3	4	5	Enjoyable	0	1	2	3	4	5
Fearful	0	1	2	3	4	5	Exhilarating	0	1	2	3	4	5
Worrying	0	1	2	3	4	5	Informative	0	1	2	3	4	5
Frightening	0	1	2	3	4	5	Challenging	0	1	2	3	4	5
Terrifying	0	1	2	3	4	5	Stimulating	0	1	2	3	4	5
Hostile	0	1	2	3	4	5	Exciting	0	1	2	3	4	5

The task was a situation:

Which was likely to get out of control	0	1	2	3	4	5
In which you were unsure of how much influence you have	0	1	2	3	4	5
In which somebody else was to blame for difficulties	0	1	2	3	4	5
In which you had to hold back from doing what you really want	0	1	2	3	4	5
Which you could deal with effectively	0	1	2	3	4	5
In which efforts to change the situation tended to make it worse	0	1	2	3	4	5
In which other people made it difficult to deal with the problem	0	1	2	3	4	5
Which was just too much for you to cope with	0	1	2	3	4	5

Finally, think about how you dealt with any difficulties or problems which arose while you were performing the task. Below are listed some options for dealing with problems such as poor performance or negative reactions to doing the task. Please indicate how much you used each option, specifically as a **deliberately chosen way of dealing with problems**. To answer circle one of the following answers:

Extremely = 4   Very much = 3   Somewhat = 2   A little bit = 1   Not at all = 0

I ...

6. DEALING WITH PROBLEMS					
1. Worked out a strategy for successful performance	0	1	2	3	4
2. Worried about what I would do next	0	1	2	3	4
3. Stayed detached or distanced from the situation	0	1	2	3	4
4. Decided to save my efforts for something more worthwhile	0	1	2	3	4
5. Blamed myself for not doing better	0	1	2	3	4
6. Became preoccupied with my problems	0	1	2	3	4
7. Concentrated hard on doing well	0	1	2	3	4
8. Focused my attention on the most important parts of the task	0	1	2	3	4
9. Acted as though the task wasn't important	0	1	2	3	4
10. Didn't take the task too seriously	0	1	2	3	4
11. Wished that I could change what was happening	0	1	2	3	4
12. Blamed myself for not knowing what to do	0	1	2	3	4
13. Worried about my inadequacies	0	1	2	3	4
14. Made every effort to achieve my goals	0	1	2	3	4
15. Blamed myself for becoming too emotional	0	1	2	3	4
16. Was single-minded and determined in my efforts to overcome any problems	0	1	2	3	4
17. Gave up the attempt to do well	0	1	2	3	4
18. Told myself it wasn't worth getting upset	0	1	2	3	4
19. Was careful to avoid mistakes	0	1	2	3	4
20. Did my best to follow the instructions for the task	0	1	2	3	4
21. Decided there was no point in trying to do well	0	1	2	3	4

Appendix K—Teamwork Survey

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Overall, the team experience was valuable.	1	2	3	4	5
2. Overall, the team process was effective.	1	2	3	4	5
3. Overall, my team was cohesive.	1	2	3	4	5
4. Everyone on my team contributed more or less equally to the team assignment.	1	2	3	4	5
5. My team members understood their responsibilities.	1	2	3	4	5
6. I felt comfortable expressing my views to the team.	1	2	3	4	5
7. My views were respected by the team.	1	2	3	4	5
8. My views were integrated and implemented in the team assignment.	1	2	3	4	5

(from Offerman, et al., 2004)

9. How long have you known the individual you were partnered with in this study?
    a. Just met today at the experiment
    b. 1-5 weeks
    c. 6-10 weeks
    d. More than 10 weeks
    e. Not applicable, I was in the Control Group.

Instruction: How well do the following statements describe your participant partner's personality?

I see my participant partner as someone who…	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
1. …is reserved	1	2	3	4	5
2. …is generally trusting	1	2	3	4	5
3. …tends to be lazy	1	2	3	4	5
4. …is relaxed, handles stress well	1	2	3	4	5
5. …has few artistic interests	1	2	3	4	5
6. …is outgoing, sociable	1	2	3	4	5
7. …tends to find fault with others	1	2	3	4	5
8. …does a thorough job	1	2	3	4	5
9. …gets nervous easily	1	2	3	4	5
10. …has an active imagination	1	2	3	4	5
11. …is considerate and kind to almost everyone	1	2	3	4	5

(from Rammstedt & John, 2007)

Item	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
10. Overall, my participant partner was helpful.	1	2	3	4	5
11. Overall, my participant partner was truthful.	1	2	3	4	5
12. Overall, my participant partner was cooperative.	1	2	3	4	5

Demographics:

1. What is your gender:
    a. Male
    b. Female

2. What is your racial group:
    a. Caucasian/White
    b. African American/Black
    c. Asian
    d. Hispanic
    e. Other (specify)

    _____

Appendix M—Feedback Forms

a. Collaboration and Competition
   Conditions

Practice Block	% Right
1	
2	

Block	% Right
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

b. Control Condition

Practice Block	% Right	Comments
1		
2		

Block	% Right	Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Table N-1.

Correlations between general intelligence and EI for the collaboration, competition, and control conditions

	General Intelligence Measures	
	Letter Series[1]	Esoteric Analogies[1]
Trait Emotional Intelligence	Collaboration Condition (*N*=121)	
TMMS[2]		
Attention to Emotion	0.106	0.113
Clarity of Emotion	0.025	-0.017
Emotion Repair	-0.022	0.049
Ability Emotional Intelligence		
STEU[3]	0.176	0.157
STEM-30[4]	0.205*	0.180*
Trait Emotional Intelligence	Competition Condition (*N*=120)	
TMMS[2]		
Attention to Emotion	-0.006	-0.016
Clarity of Emotion	0.046	0.030
Emotion Repair	0.098	-0.006
Ability Emotional Intelligence		
STEU[3]	0.262**	0.209*
STEM-30[4] (*N*=118)	0.236*	0.108
Trait Emotional Intelligence	Control Condition (*N*=70)	
TMMS[2]		
Attention to Emotion	-0.090	-0.096
Clarity of Emotion	-0.199	-0.157
Emotion Repair	0.196	-0.023
Ability Emotional Intelligence		
STEU[3]	0.498***	0.439***
STEM-30[4] (*N*=69)	0.392**	0.209

[1] Letter Series, Esoteric Analogies (Stankov, 2000); [2] Trait Meta-Mood Scale (Salovey et al., 1995); [3] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [4] Situational Test of Emotion Management (MacCann & Roberts, 2008)
*$p < .05$; **$p < .01$; ***$p < .001$

Appendix O

Table O-1.

Correlations between trait and ability EI measures for collaboration, competition, and control conditions

	Ability Emotional Intelligence	
	STEU[1]	STEM-30[2]
Trait Emotional Intelligence		
	Collaboration Condition	
	(*N*=121)	(*N*=121)
TMMS[3]		
Attention to Emotion	-0.039	0.048
Clarity of Emotion	0.131	-0.030
Emotion Repair	0.212*	0.126
	Competition Condition	
	(*N*=120)	(*N*=118)
TMMS[3]		
Attention to Emotion	0.157	0.155
Clarity of Emotion	0.023	0.092
Emotion Repair	0.186*	0.179
	Control Condition	
	(*N*=70)	(*N*=69)
TMMS[3]		
Attention to Emotion	0.039	0.254*
Clarity of Emotion	0.006	0.045
Emotion Repair	0.139	0.143

[1] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [2] Situational Test of Emotion Management (MacCann & Roberts, 2008); [3] Trait Meta-Mood Scale (Salovey et al., 1995)

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

Table P-1.

Correlations between general and emotional intelligence and subjective states measured before and after the discrimination learning task for each condition

| | DSSQ[1] Subjective State | | | | | |
| | Pre-task | | | Post-task | | |
	Worry	Engage	Distress	Worry	Engage	Distress
Collaboration Condition (*N*=121)						
General Intelligence[2]						
Letter Series	0.155	-0.059	-0.017	0.153	0.137	-0.001
Esoteric Analogies	-0.036	0.003	0.000	-0.003	0.165	-0.146
Emotional Intelligence						
TMMS[3]						
Attention to Emotion	0.190*	0.078	-0.282**	-0.004	0.095	-0.039
Clarity of Emotion	-0.148	0.372***	-0.438***	-0.157	0.240**	-0.284**
Emotion Repair	-0.288**	0.313***	-0.443***	-0.368***	0.130	-0.196*
STEU[4]	-0.280**	0.115	-0.233*	-0.032	0.035	-0.236**
STEM-30[5]	-0.082	0.185*	0.006	-0.071	0.084	-0.093
Competition Condition (*N*=120)						
General Intelligence[2]						
Letter Series	-0.153	0.090	-0.167	-0.143	0.108	-0.072
Esoteric Analogies	-0.074	-0.070	-0.116	-0.146	0.017	-0.063
Emotional Intelligence						
TMMS[3]						
Attention to Emotion	0.053	0.036	-0.172	-0.061	0.152	-0.215*
Clarity of Emotion	-0.155	0.260**	-0.296**	-0.178	0.146	-0.212*
Emotion Repair	-0.153	0.092	-0.308**	-0.050	0.004	-0.147
STEU[4]	-0.211*	0.085	-0.237**	-0.287**	0.113	-0.114
STEM-30[5] (*N* = 118)	-0.207*	0.260**	-0.253**	-0.118	0.241**	0.081
Control Condition (*N*=70)						
General Intelligence[2]						
Letter Series	-0.278*	0.201	-0.076	0.115	0.299*	0.088
Esoteric Analogies	-0.102	-0.072	-0.118	-0.257*	0.065	0.035
Emotional Intelligence						
TMMS[3]						
Attention to Emotion	0.051	0.018	-0.095	-0.013	0.032	-0.042
Clarity of Emotion	-0.261*	0.249*	-0.427***	-0.314**	0.006	-0.312**
Emotion Repair	0.004	0.320**	-0.391**	0.211	0.299*	-0.151
STEU[4]	-0.222	0.159	-0.074	0.016	0.189	0.081
STEM-30[5] (*N*=69)	-0.058	0.126	0.042	0.083	0.206	-0.041

[1] Dundee Stress State Questionnaire (Matthews et al., 1999) [2] Letter Series, Esoteric Analogies (Stankov, 2000); [3] Trait Meta-Mood Scale (Salovey et al., 1995); [4] Situational Test of Emotional Understanding (MacCann & Roberts, 2008); [5] Situational Test of Emotion Management (MacCann & Roberts, 2008).

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

Appendix Q

Correlations between self-reported personality and subjective states measured before and after the discrimination learning task for conditions

	DSSQ[1] Subjective State					
	Pre-task			Post-task		
	Worry	Engage	Distress	Worry	Engage	Distress
Collaboration Condition						
3M40[2] (*N*=121)						
Extraversion (E)	-0.159	0.173	-0.447***	-0.227*	0.186*	-0.206*
Agreeableness (A)	-0.131	0.350***	-0.336***	-0.261**	0.308**	-0.199*
Conscientiousness (C)	-0.069	0.286**	-0.176	-0.138	0.181*	-0.084
Neuroticism (N)	0.302**	-0.243**	0.352***	0.331***	-0.125	0.280**
Openness (O)	0.087	0.234*	-0.237**	-0.003	0.138	-0.074
Competition Condition						
3M40[2] (*N*=121)						
Extraversion (E)	-0.196*	0.015	-0.426***	-0.147	-0.179	-0.187*
Agreeableness (A)	0.022	0.118	-0.142	0.058	0.074	-0.316***
Conscientiousness (C)	-0.117	0.224*	-0.251**	-0.049	0.024	-0.262**
Neuroticism (N)	0.288**	-0.052	0.320***	0.043	0.224*	0.117
Openness (O)	0.017	0.152	-0.254**	-0.053	0.119	-0.202*
Control Condition						
3M40[2] (*N*=70)						
Extraversion (E)	0.119	0.144	-0.049	0.198	-0.011	0.007
Agreeableness (A)	0.232	0.091	-0.153	0.174	0.105	-0.121
Conscientiousness (C)	-0.008	0.119	-0.258*	0.014	-0.095	-0.182
Neuroticism (N)	0.371**	-0.267*	0.409***	0.228	-0.043	0.056
Openness (O)	0.065	0.017	-0.265*	0.034	0.035	-0.281*

[1] Dundee Stress State Questionnaire (Matthews et al., 1999); [2] 3M40 (Saucier, 2003)
*$p < .05$; **$p < .01$; ***$p < .001$

Appendix R

Table R-1.

Correlations between other-reported personality and subjective states measured before and after the discrimination learning task for collaboration and control conditions

	DSSQ[1] Subjective State					
	Pre-task			Post-task		
	Worry	Engage	Distress	Worry	Engage	Distress
Collaboration Condition						
BFI-11[2] (*N*=121)						
Extraversion (E)	-0.044	0.246**	-0.122	-0.221*	0.276**	-0.250**
Agreeableness (A)	0.168	0.277**	-0.193*	-0.019	0.368***	-0.232*
Conscientiousness (C)	0.129	0.159	-0.167	-0.068	0.269**	-0.234*
Neuroticism (N)	-0.078	-0.280**	0.187*	0.047	-0.197*	0.140
Openness (O)	0.104	0.042	-0.158	-0.090	0.081	-0.181*
Competition Condition						
BFI-11[2] (*N*=120)						
Extraversion (E)	-0.015	-0.069	0.009	-0.037	-0.019	-0.059
Agreeableness (A)	-0.031	0.070	-0.157	0.055	0.115	-0.140
Conscientiousness (C)	-0.145	0.137	-0.124	-0.104	0.150	-0.098
Neuroticism (N)	0.038	-0.308**	0.101	0.031	-0.243**	0.073
Openness (O)	0.070	-0.202*	-0.067	-0.024	0.133	-0.054

[1] Dundee Stress State Questionnaire (Matthews et al., 1999); [2] Big Five Inventory (Rammstedt & John, 2007)
*p < .05; **p < .01; ***p < .001