A psychometric evaluation of the emotional intelligence ability construct among working adult Australians

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Abstract

The broad aim of the research reported here was to evaluate key psychometric issues identified in relation to ability measures of emotional intelligence (EI). To investigate these issues, three studies were conducted including only participants from business and organisational backgrounds. In Study 1, the responses of 231 participants were analysed through a series of confirmatory factor analysis models to evaluate the factor structure of an EI ability measure (MEIS). Results of these analyses were generally consistent with past research, including the observation of non-positive definite matrices for more complex models. Study 2 examined the discriminant validity of the MEIS by comparing the MEIS scores of 147 participants with their responses to the NEO PI-R. Consistent with past research minimal correlations were observed between MEIS scores and NEO PI-R factor scores, indicating that the two instruments measure distinct constructs. There was also good convergence between the two alternative scoring methods for the MEIS, expert- and consensus-based, suggesting that the two scoring methods are comparable when an Australian organisational consensus group is used. As others have suspected (e.g. Palmer, Gignac, Manocha & Stough, 2005) although not investigated, a significant gender by scoring method interaction was observed for the MEIS in Study 2. Study 3 investigated the convergent validity of the MEIS by comparing MEIS scores from 45 participants with their scores on a measure of verbal reasoning. Moderate yet significant correlations were observed indicating that the two measures were related but not to the extent that they were measuring the same construct.
General Acknowledgements

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I would like to thank my mother Sheila Stritch, and my wife Stephanie Stritch, for their love and support during the writing of this thesis.

Finally, I wish to dedicate this thesis to the memory of my father, Cyril Patrick Stritch, who sadly passed away before this thesis was completed.
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General Introduction

Few recent theories within the fields of social, cognitive and organisational psychology have generated as much interest and indeed controversy, as that generated by emotional intelligence (EI). Just as the identification, definition and measurement of cognitive intelligence or IQ has stimulated over a century of debate within academic (and wider) literature, so too this latest addition to the “family” of intelligence(s) looks set to continue that debate.

Indeed some of the ongoing issues raised in the debate on emotional intelligence are very reminiscent of those raised during the development of intelligence theory and its measures. Similarly, the three or four groups of researchers active in developing theories of EI and measures to support those theories have engaged in robust debate and criticism of each other’s theoretical positions and measures. This current research considers some of the issues raised during the course of the EI debate, with specific emphasis on evaluating these issues within an applied or organisational context. As with the ongoing debate on intelligence, argument in the emotional intelligence domain has sometimes arisen regarding how EI should be defined.

Emotional intelligence defined

Emotional intelligence (EI) was a term first used within published academic literature by two American psychologists, Dr. John Mayer and Dr. Peter Salovey (Salovey & Mayer, 1990). Mayer and Salovey initially defined emotional
intelligence as “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them, and to use this information to guide one’s thinking and action” (p. 189). Although Salovey and Mayer were eventually to outline a mental ability conceptualisation of EI, this initial definition described broader constructs. They later revised this definition so that EI is “the ability to perceive accurately, appraise and express emotion; the ability to access and/or generate feelings that facilitate thought; the ability to understand emotion and emotional knowledge and the ability to regulate emotions to promote emotional and intellectual growth” (Mayer & Salovey, 1997, p. 10). This revised definition was underpinned by an argument that EI theory should be constrained to reflect only a mental ability approach, separate from personality traits. By keeping emotional intelligence separate from constructs like personality, Mayer and colleagues hoped to “analyse the degree to which they independently contributed to a person’s behaviour and general life competence” (Mayer, Salovey & Caruso, 2000, p.402).

Mayer and Salovey (1997) stipulated four core abilities or what they term ‘Branches’ which constitute emotional intelligence. The first Branch related to the perception and identification of emotional information, such as recognising emotions in facial expressions. The second Branch of the model, ‘Emotional Facilitation of Thinking’ described, in part, an individual’s ability to generate emotions, in order to assist them to make judgments or access memories. The third Branch of the model was ‘Understanding and Analysing Emotions and Employing Emotional Knowledge’, the ability to understand complex feelings and emotional nomenclature, and also an appreciation for why emotions may change over time. The final Branch of the model, ‘Reflective Regulation of Emotions to Promote Emotional and Intellectual Growth’, described a person’s ability to
recognise when emotions are useful or harmful, and to engage appropriate strategies based on this evaluation. This Branch also describes an ability to reflectively monitor emotions relating to oneself or others, and recognise how typical, reasonable or relevant they are.

**Broader approaches to emotional intelligence theory development**

As Mayer and Salovey (1997) were defining EI narrowly within a mental ability context, Bar-On (1997), Boyatzis, Goleman and Rhee (1999) and others were developing EI theories and measures that also encompassed broader personality and competency frameworks.

The EQ-i (1997) contains sections on intrapersonal competencies, interpersonal competencies, stress management, adaptability, general mood, and positive impression. This assessment is based on Bar-On’s (1997) EI model where a set of emotional competencies rather than EI abilities were outlined. Bar-On argued that because these competencies are adaptive, i.e. they allow us to meet life’s challenges, they constitute an intelligence. By way of illustration, Bar-On (1997) asserted that intelligence is comprised of the abilities, competencies and skills which represent “a collection of knowledge used to cope with life effectively. The adjective *emotional* is employed [in Bar-On’s model] to emphasize that this specific type of intelligence differs from cognitive intelligence” (p.15).

Bar-On, Tranel, Denburg and Bechara (2003), like Mayer and colleagues, acknowledge the role played by social intelligence in shaping EI theory. However, rather than replacing social intelligence with EI as Mayer and colleagues sought to
do, Bar-On and colleagues extend their definition of EI to include social intelligence. They observe that due to the conceptual proximity of the two intelligences, they may be considered as “different aspects of the same construct and could actually be referred to as ‘emotional and social intelligence’.” (p. 1791). EI according to Bar-On and colleagues is thus “a multifactorial array of interrelated emotional, personal, and social competencies that influence our ability to actively and effectively cope with daily demands” (p.1791). These competencies are incorporated into five areas:

- The ability to be aware of and express emotions.
- The ability to be aware of others’ feelings and to establish interpersonal relationships.
- The ability to manage and regulate emotions.
- The ability to realistically and flexibly cope with the immediate situation and solve problems of a personal and interpersonal nature as they arise.
- The ability to generate positive affect in order to be sufficiently self-motivated to achieve personal goals.

To distinguish between EI as emotional abilities solely, and EI which includes a mixture of emotional abilities and competencies, imagine someone described in relation to the first component of the two models. The first component of both models relates to the identification and expression of emotions as well as an awareness of emotions. A description of an individual according to the Mayer-Salovey model of EI on this component would include the capacity of that individual to accurately identify emotions in themselves and others. A description of the same
individual according to Bar-On’s model of EI would also address whether the person is actually using or applying these emotional skills or abilities, in this case whether the person accurately identifies emotions in themselves and others in real life.

Another way of describing this difference may be illustrated through an analogy with cognitive intelligence using verbal intelligence as an example. Verbal intelligence tests assess an individual’s ability to reason with and use verbal information, but verbal competency might be assessed for example by looking at how well the individual applies their verbal intelligence in a real-world context such as constructing an argument and understanding others’ arguments on an issue. So the essential difference between an ability and a competency, is the former describes a person’s skill set and the latter extends this description to include how successfully a person uses that skill set. Thus Bar-On’s inclusion of competencies as well as abilities and skills, broadens the EI definition beyond just emotional abilities but includes personal and social competencies, as well as an application of these abilities.

Mayer et al. (2000) suggest that Bar-On’s original rationale for developing his emotional intelligence model was borne out of a need to answer the question “Why are some individuals more able to succeed in life than others?” (p.402). Mayer et al. contend that Bar-on reviewed the personality literature to identify characteristics that were predictive of life success to identify the broad areas of functioning represented in his model. In their opinion, emotional intelligence was therefore linked with personality characteristics in Bar-On’s framework from the beginning.
Others have also outlined competency models in their theories of emotional intelligence. Although probably the most successful in publicising the term “emotional intelligence”, Goleman (1998) moves away from a grounding in intelligence theory, when he identifies five dimensions in his EI framework which are comprised of twenty-five emotional competencies. “An emotional competence is a learned capability based on emotional intelligence that results in outstanding performance at work” (p. 24). This framework was later revised to contain four competency areas: self-awareness, self management, social awareness and relationship management (Goleman, Boyatzis & McKee, 2002). Goleman (1998), like Bar-On et al (2003), regards emotional intelligence as a combination of emotional and social competencies. Goleman listed several constructs within his emotional competency model, which are derivative of broader personality constructs. These include self-confidence, conscientiousness, achievement drive and optimism. Moreover, additional facets of Goleman’s competency model, such as political awareness, influence, leadership, conflict management, service orientation, and developing others (p.27), reflect broader leadership and organisational competencies.

Mayer et al. (2000) characterise both Bar-On’s (1997) and Goleman’s (1995; 1998) EI theories as ‘mixed-model’ theories of emotional intelligence because they incorporate individual differences other than intelligence (e.g. personality). These models have also been termed competency models (Goleman, 1998). More recently Petrides and Furnham (2003) have used the term ‘Trait EI’ to describe these non-ability models of EI, where “Trait EI refers to a constellation of emotion-related self-perceptions and dispositions” (p. 40).
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Ashkanasy and Daus (2005) also distinguish between ability and mixed model theories and measures of EI in describing 3 “streams” of EI research. Stream 1 is based on Mayer and Salovey’s (1997) four-branch ability model of EI and is measured by ability measures such as the MEIS and most recently the MSCEIT. Stream 2 includes various self- and peer-report measures (e.g. Jordan, Ashkanasy, Härtel & Hooper, 2002, Wong and Law, 2002; cited in Ashkanasy & Daus, 2005) which are based on the ability model although these measures are not performance-based as are the Stream 1 measures. The third stream is comprised of the mixed-model or trait theories and measures of EI just described.

The differences between ability (Stream 1) and trait or competency (Stream 3) models of EI are discussed in more detail in Study 2, specifically with respect to their different relationship with personality. However in summarising the early development of emotional intelligence theory it can be said that one group of influential EI theorists (e.g. Mayer et al., 2000) made a decision to study EI independently of broader individual difference constructs, and within a mental ability framework. Other influential researchers and authors (e.g. Bar-On, 1997; Goleman, 1998; Petrides & Furnham, 2003) have chosen to broaden their definitions of EI to include other individual difference constructs such as personality or disposition. Because of the significant difference in the way EI is conceptualised, conclusions based on the Stream 3 models should not be compared with those based on Stream 1 or Stream 2 models. Moreover, because Stream 1 and Stream 2 models have also been shown to reflect different EI constructs (Joseph & Newman, 2010), caution should be exercised in equating these two streams also.
There is at least one area of agreement between some of those advocating EI as a legitimate area of research and those contrary to this position, in so far as both ‘camps’ agree that the Mayer-Salovey EI ability model is the only avenue worthy of further investigation in evaluating the viability of the EI construct (Antonakis, Ashkanasy & Dasborough, 2009). The pre-eminence of the EI ability model is also supported by the most recent meta-analytic investigation of the emotional intelligence construct (see Joseph & Newman, 2010). Although the purpose of this research is not to consider which model of EI is best, recent research suggests that the EI ability model is worthy of continued investigation. This research therefore examines the psychometric properties of an EI ability measure. Many researchers have studied the psychometric properties of EI ability measures (Ciarrochi, Chan & Caputi, 2000; Gignac, 2005; MacCann, Roberts, Matthews & Zeidner, 2004; Mayer, Salovey & Caruso, 1999; Palmer, Gignac, Manocha & Stough, 2005; Roberts, Zeidner & Matthews, 2001; Rossen, Kranzler & Algina, 2008) and this research contributes to the existing body of psychometric data, and extends it through its inclusion of Australian organisational groups.

**Emotional intelligence in organisations**

Since the emergence of the term “emotional intelligence”, EI assessments have been adopted for use in organisational settings (MacCann, Matthews, Zeidner & Roberts, 2003), and EI is increasingly being used in selection settings (Van Rooy, Alonso & Viswesvaran, 2005b). Because of the use of EI assessments in organisations, the ongoing debate about EI includes calls for greater understanding about organisational applications. Brody (2004) has argued that there is no foundation for the use of ability EI assessments in applied settings,
largely due to many of the criticisms raised by Roberts et al. (2001) which are discussed later. The paucity of organisational research in the emotional intelligence literature observed by researchers such as Landy (2005), in conjunction with Brody's observations regarding the organisational utility of EI based on the criticisms of other researchers, suggest that a good way to add to the understanding of this construct is by sampling work and organisational groups to explore the major criticisms of EI ability found in published research.

Organisational and work samples are included in this research because researchers (e.g. Landy, 2005) have indicated that the ‘database’ on which applied EI speculation rests, is embarrassingly flimsy. Also, as other researchers such as Gohm (2004) have noted, culturally appropriate responses for EI ability test items may vary as a function of the cultural norms of the group responding to these items with differences in what the “correct” response would be in the workplace, in educational settings etc. So based on this argument one might expect differences in the responses of university students and working individuals on an EI ability measure.

Moreover, it could be argued that because the majority of university students studied within the EI ability literature were psychology students, this group is likely to be more familiar with psychometric testing and indeed more familiar with EI theories, and thus potentially more likely to score higher on an EI ability measure. For example, some researchers (e.g. Brackett, Rivers, Shiffman & Salovey, 2006) have argued that EI may represent a threshold construct whereby there is a minimum level of EI ability required to function effectively and successfully in everyday life. This has led other researchers such as Freudenthaler, Neubauer
and Haller (2008) to suggest that the use of university samples, especially undergraduate psychology students, may result in a ceiling effect for EI studies including such samples, because the sampling domain is largely restricted to participants having already attained that EI threshold.

Given a lack of organisational data for EI ability measures and the sampling range issues discussed, coupled with the fact that EI measures are increasingly being used in a variety of organisational contexts (MacCann, Matthews, Zeidner, & Roberts, 2003), where concerns also arise regarding their use in high stakes situations (Van Rooy, Alonso & Viswesvaran, 2005b; Zeidner, Matthews & Roberts, 2008), it is important that more research involving working populations is conducted.

The current research

Debate over emotional intelligence and its suitability for use in organisations prompted the current research. It provided an opportunity to respond to some of the questions raised in the psychological literature regarding the first measure of EI ability used in organisations, the Multifactor Emotional Intelligence Scale (MEIS, Mayer, Salovey & Caruso, 1997a), and by extension criticisms relating to the viability of the EI ability theory. The current research addresses the reliability and validity of the MEIS, with interest in the first study focused on issues identified in the literature, principally the factor structure of ability measures (Gignac, 2005; Palmer et al., 2005; Roberts et al., 2001; Rossen et al., 2008), and in the second study on problems associated with how ability measures are scored (MacCann et al., 2003; Roberts et al., 2001). Because there has been little organisational
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research reported using this measure and a lack of results from adult populations in general, both of these studies use adult Australian working samples.

Study 2 also examines the discriminant validity of the MEIS instrument by exploring the degree of correlation between this measure and an established measure of personality, namely the NEO PI-R (Costa and McCrae, 1992). The overlap between EI measures and measures of personality constitutes the basis for some criticism found in the literature (Conte, 2005; Davies, Stankov & Matthews, 1998; Roberts et al., 2001). Moreover, Mayer and colleagues (e.g. Mayer, Salovey and Caruso, 2008) have specified that measures of EI ability should be distinct from personality measures. Further examining the relationship between EI and personality by studying the responses of working Australian adults, will add to this understanding within an applied or working context.

Finally, the third study also includes a sample of adult working Australians to further explore construct validity issues using the MEIS, specifically its convergent validity. Study 3 examines the relationship between emotional intelligence and verbal intelligence, because an important psychometric criterion in the classification of EI ability as an intelligence is that it should demonstrate a modest relationship with other intelligences, such as verbal intelligence (Mayer, Salovey & Caruso, 1999).

Design of Studies

The design of the three studies is consistent with previous research, as summarised by Zeidner et al. (2008), specifically that studies of the construct
validity of EI ability, have focused on factorial validity and convergent and discriminant validity evidence. These three studies obtained data in fundamentally different ways to explore validity-related issues arising from the debate about EI and its measures. The first and second studies accessed data that were generated for organisational purposes and is, therefore, typical of a field research design. The advantage of such data lies in their usefulness in examining the psychometric properties of the MEIS (including its factor structure, scoring reliability and the relationship between subtests), its divergent validity and its generalisability to applied settings. The third study also used a field research design with similar participants (i.e. a sample of working Australian adults) to examine the convergent validity of the MEIS.

Rationale for including the MEIS in the current research

The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT: Mayer, Salovey & Caruso, 2002) is the successor to the MEIS and is the only performance-based measure currently published for assessing the four Branches of the EI ability model. There are a number of reasons why the MEIS, and not the MSCEIT, was used to investigate EI ability in this research.

At the time planning for the research studies began, published psychometric studies of EI ability pertained exclusively to the MEIS (e.g. Ciarrochi et al, 2000; Mayer et al., 1999; Roberts et al., 2001). Although preliminary data for the MSCEIT were available around the time of planning the current research (Mayer, Salovey, Caruso & Sitarenios, 2001), the complete psychometric findings of this research were not published until some time later (Mayer, Salovey, Caruso & Sitarenios,
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2003). At the time data collection for Study 1 was begun in early 2002 it represented an attempt to extend the psychometric investigation of the MEIS to include a cross-section of participants working in Australian organisations. Because all three studies involve an investigation of the psychometric properties of an EI ability measure, it was logical to keep the same measure throughout.

The MEIS is appropriate for the purposes of exploring the EI ability model, as evidenced by the frequent use of MEIS research in conjunction with MSCEIT research, to describe the current status of this model (e.g. Daus & Ashkanasy, 2005; Mayer et al., 2008; Van Rooy, Viswesvaran, & Pluta, 2005a; Zeidner et al., 2008). Indeed some researchers have argued that the MEIS may even represent a superior measure to the MSCEIT (MacCann et al., 2003). In any event, an investigation of the psychometric properties of an EI ability measure using the MEIS, instead of the MSCEIT, is therefore still relevant to contemporary discussions regarding emotional intelligence ability.

In addition, there were a number of practical considerations which influenced the selection of the MEIS as the measure of EI ability for this research. Firstly, the MEIS was the only EI ability test available for commercial use at the time data collection for Study 1 was begun. Although a research version of the MSCEIT was available at the time data collection commenced, Study 1 includes a convenience sample of individuals working in Australian organisations, where MEIS assessments were used for organisational purposes. A peer-reviewed and commercially published measure, the MEIS, was selected by these organisations as most appropriate for these purposes and therefore this is the data available at the time.
Secondly, in Study 2 expert- and consensus-based scoring algorithms were derived for the purpose of assessing the convergence of these two scoring methods. In planning this study it was thought that due to commercial confidentiality reasons, Multi Health Systems (MHS), the owners and publishers of the MSCEIT, would not allow the same freedom with respect to scoring algorithms guaranteed by the publisher of the MEIS, CJ Wolfe Associates.

Finally, this research was not funded in any way and under the agreement from the publisher of the MEIS, administration and scoring of the MEIS for research purposes did not attract any fee (The research version of the MSCEIT attracted a fee of US$5 per participant).
Study 1: Psychometric properties of the MEIS: Factor structure

Introduction

The Multifactor Emotional Intelligence Scale

The Multifactor Emotional Intelligence Scale (MEIS: Mayer, Salovey and Caruso, 1997a) was the first measure designed to assess Mayer and colleagues’ (e.g. Mayer et al., 1999) four EI abilities, or Branches. In the original validation study of the measure (Mayer et al., 1999), the MEIS was comprised of 12 subtests which assessed these four Branches (see Figure 1). The first Branch is Perceiving Emotion, also referred to as Identifying Emotions. In the first subtest of this Branch, the Faces subtest, respondents must indicate on several emotion word scales what emotions are being expressed by individuals presented in photographs. This ability is similar to that measured by the Ekman-60 faces test, a component of the Facial Expression of Emotions – Stimuli and Tests (FEEST: Young, Perrett, Calder, Sprengelmeyer & Ekman, 2002). Indeed Ekman and Rosenberg’s (1997) research on the representation of emotions through facial expressions and subsequent creation of the Facial Action Coding System (FACS) directly influenced one of the ways emotional identification was defined and measured within Mayer et al’s ability model (D. Caruso, personal communication, September 23, 2000).
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The second Branch of the EI model assessed by the MEIS is Assimilating Emotions, also referred to as Using Emotions. The first subtest of this Branch, the

Figure 1: Branch and Subtests of the Multifactor Emotional Intelligence Scale (MEIS)

<table>
<thead>
<tr>
<th>BRANCH 1</th>
<th>BRANCH 2</th>
<th>BRANCH 3</th>
<th>BRANCH 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceiving Emotion</td>
<td>Assimilating Emotions</td>
<td>Understanding Emotions</td>
<td>Managing Emotions</td>
</tr>
<tr>
<td><strong>Subscale</strong></td>
<td><strong>Subscale</strong></td>
<td><strong>Subscale</strong></td>
<td><strong>Subscale</strong></td>
</tr>
<tr>
<td><strong>Faces:</strong> Stimuli = 8 Items = 48</td>
<td><strong>Synesthesia:</strong> Stimuli = 6 Items = 60</td>
<td><strong>Blends:</strong> Stimuli = 8 Items = 8</td>
<td><strong>Managing feelings of the self</strong></td>
</tr>
<tr>
<td><strong>Music:</strong> Stimuli = 8 Items = 48</td>
<td><strong>Feeling Biases:</strong> Stimuli = 4 Items = 28</td>
<td><strong>Progressions:</strong> Stimuli = 8 Items = 8</td>
<td>Stimuli = 6 Items = 24</td>
</tr>
<tr>
<td><strong>Designs:</strong> Stimuli = 8 Items = 48</td>
<td></td>
<td><strong>Transitions:</strong> Stimuli = 4 Items = 24</td>
<td><strong>Managing feelings of others</strong></td>
</tr>
<tr>
<td><strong>Stories:</strong> Stimuli = 6 Items = 42</td>
<td></td>
<td><strong>Relativity:</strong> Stimuli = 4 Items = 40</td>
<td>Stimuli = 6 Items = 24</td>
</tr>
</tbody>
</table>

Adapted from Mayer et al. (1999)
Synesthesia subtest, requires the respondent to generate specific emotions internally and then describe these emotions in terms of dichotomous word pairs, such as hot or cold and fast or slow. The third Branch, Understanding Emotions, assesses the type of knowledge outlined by researchers such as Clore and Ortony (2000) and Levenson (1994) regarding the logic and rules of emotions, such as the observation that blocked goals or unattained ends lead to unpleasant emotions. In assessing this Branch, MEIS subtests also assess respondents’ understanding of emotional definitions as well as their capacity to take the emotional perspectives of others. The fourth and final Branch assessed by the MEIS is Managing Emotions. In this Branch, respondents are presented with emotional scenarios in the form of written vignettes and provided with possible solutions to these scenarios. The respondent must then rate each solution in terms of likely effectiveness. The MEIS version used in this research contains fewer subtests than the version employed by Mayer et al. (1999) and its structure is outlined further in the Method section of Study 1.

Mayer et al. (1999) administered the MEIS to 503 American adults and 229 adolescents. Based on their results the authors maintained that emotional intelligence met three key psychometric properties (standards) for an intelligence namely, that it can be operationalised as a set of ability tests; that performance on these ability tests intercorrelate (positive manifold) and show a partial correlation with other tests of mental ability; and that performance increases with age and experience. The authors also demonstrated a positive statistical relationship between emotional intelligence, and other relevant real-world criteria as indexed by empathy, life satisfaction and parental warmth metrics.
Psychometric Properties of the MEIS

Much criticism of the MEIS, and consequently the EI ability model, is underpinned by somewhat inconsistent findings on whether the MEIS satisfies the psychometric properties that Mayer and colleagues stipulate must be met in order for it to be considered a measure of intelligence. This includes validity concerns regarding the proposed factor structure of the MEIS and the relationship between subtests of the MEIS.

The factor Structure of the MEIS

Correlational and factor analysis has been conducted on scores for EI ability measures, specifically the MEIS and MSCEIT, in an attempt to better understand the factor structure of these measures and the EI ability model in general.

Factor Analysis

Mayer et al. (1999) conducted exploratory and confirmatory factor analysis on their data set of MEIS scores from 503 American adults. Approximately half of these participants were full-time college students, and the remaining participants were comprised of part-time college students, corporate employees, career workshop attendees and executives in outplacement programs. A principal axis factor analysis revealed a first factor which the authors called “general emotional intelligence” (p. 284) because this factor loaded all subtests of the MEIS. The second factor discriminated between Emotional Perception subtests and
Understanding Emotions subtests, while the third factor loaded both subtests of the Managing Emotions Branch. Following oblimin rotation of the data set a three-factor model was found to best fit the data. The first factor loaded all subtests from the Understanding and Assimilating Emotions branches of the MEIS. The second factor loaded all subtests of the Emotional Perception branch and the third factor loaded both subtests of the Managing Emotions branch. These three factors were moderately intercorrelated ($r = .33$ to $r = .49$) with each other.

Because Mayer et al’s (1999) theoretical model conceives of a four-factor model of EI ability, they then submitted the same MEIS scores to confirmatory factor analysis (CFA) to establish the goodness of fit of a four factor solution to their data set. Mayer et al. stated that covariance structural modeling suggested a four factor solution provided a sufficiently good model-fit as to be informative. The authors quote a root mean square error of approximation (RMSEA) that is within acceptable limits ($RMSEA = .09$), although no chi-square fit index, goodness-of-fit index (GFI) nor comparative fit index (CFI) values are presented, meaning that the RMSEA value could just reflect the simplicity of the model under investigation. As with the exploratory factor analysis (EFA), within this factorial solution the Assimilating and Understanding Emotions factors are highly inter-correlated ($r = .87$) so the authors elect to focus on a three-factor model in subsequent analyses.

To conduct a secondary check of the general emotional intelligence factor observed in the original exploratory factor analysis, a hierarchical factor analysis was conducted by Mayer et al. using the three sets of factor scores from the original EFA. A single hierarchical factor was extracted which loaded all three factors ($r = .50$ to .86) and correlated $r = .94$ with the unrotated first factor of the
principal axis factoring. Mayer et al concluded that “general emotional intelligence can be reasonably represented by the first unrotated principal axis factor, and that it loads all the scales studied” (p. 286).

Roberts et al. (2001) examined the MEIS and reported support for the general EI factor proposed by Mayer et al. (1999), in an exploratory factor analysis of MEIS scores from 704 US air force trainees. Following direct oblimin rotation of the data, a three-factor solution emerged which is similar to the rotated solution reported by Mayer et al (1999), with Emotion Perception, Understanding Emotions and Managing Emotions subtests loading on Factors 1, 2 and 3 respectively. However the rotated solution reported by Roberts et al. did not produce evidence that Assimilating Emotions and Understanding Emotions combine on a single factor, as Mayer et al had reported for their data. Rather they found that the two subtests of the Assimilating Emotions Branch of the MEIS did not constitute unifactorial scales because they loaded about equally on each of the three factors. These results led Roberts and colleagues to state that the Assimilating Branch is “both factorially complex and underrepresented by what ever the other tests are assessing” (p. 217). Contrary to the interpretation of Mayer and colleagues factor analysis results, Roberts et al. concluded that their three rotated factors did not capture the four Branches of the MEIS.

Consistent with the Mayer et al. study, confirmatory factor analysis of Roberts et al’s (2001) data suggested that a four-factor model was a good fit to the data, and based on their discussion of these results this is the authors’ preferred factor interpretation for their data set. The rejection of a three-factor solution and interpretation of a four-factor solution by Roberts et al. seems, in part, because of
the concern regarding the unifactorial nature of the Assimilating Emotions subtests which was raised during the exploratory factor analysis.

Ciarrochi et al. (2000) also identified a different factor structure than the one proposed by Mayer et al. (1999). Ciarrochi and colleagues interpreted a two-factor solution for the MEIS based on the responses of 134 Australian psychology undergraduates, in an exploratory factor analysis using principal components analysis. The first factor ‘General Emotional Intelligence' loaded all subtests, and the second factor is described by the authors as discriminating between subtests “that involve emotional identification from the ‘higher’ processes involved in managing and understanding emotions” (p. 549). Following Varimax rotation, a two factor solution was produced, where all emotion perception subtests loaded on the first rotated factor, and the remaining subtests loaded on the second rotated factor.

In order to cross-validate earlier MEIS studies that supported one-, two- and four-factor solutions of the EI domain, Mayer et al. (2003) subjected the MSCEIT to confirmatory factor analysis. This analysis was based on the MSCEIT scores of 2,112 individuals who were tested by independent investigators in 36 separate academic settings. Within the confirmatory factor analysis model it was proposed that the one-factor general intelligence model should load all the subtests of the EI ability measure (MSCEIT). The two-factor model should divide the EI ability measure into an Experiential and Strategic area, where the former is comprised of subtests from the first two Branches of the MSCEIT and the latter is comprised of subtests from the last two Branches. Finally, the four-factor model should load all subtests on their respective Branches. Mayer et al. report a progressively better fit of models from the one- to four-factor model, and a reasonable fit for all three
models investigated. Fit indices were good across all models, with the normed fit index (NFI) ranging from .99 to .98 across all models and the Tucker-Lewis index (TLI) ranging from .98 to .96. The RSMEA values ranged from .12 for the one-factor solution, which the authors acknowledge is a bit high, to .05 for the four-factor solution, a value deemed adequate by Mayer and colleagues. Mayer et al concluded that “one-, two-, and four-factor models provide viable representations of the EI domain” (p. 104).

Gignac (2005) reanalyzed the data set of Mayer et al. because of irregularities in the values of the fit indices. These irregularities were due to an alteration in the way fit indices were calculated by the statistical software Gignac used (AMOS 4.02) as opposed to the way fit indices were calculated by the software (AMOS 4.0) used in the Mayer et al. (2003) study (Mayer, Panter, Salovey, Caruso & Sitarenios, 2005). Because of the changes to fit indices calculations, and contrary to Mayer et al’s (2003) interpretation, Gignac’s interpretation of the same data suggests that one- and two-factor models fail to provide acceptable solutions to the data set, as specified by the criteria laid out in Mayer et al (2003). In addition, although Gignac found that the Mayer et al. data supported a four-factor solution, it was noted that a four-factor solution was not viable when a certain equality constraint was removed. This equality constraint had been introduced by Mayer et al. (2003) to reduce a high covariance between Perceiving Emotion and Assimilating Emotion Branch scores. This was done by constraining the covariance between Perceiving Emotion and Assimilating Emotion Branch scores, and the covariance between Understanding and Managing Emotions Branch scores, to be equal. Gignac’s analysis and interpretation of the results leads to the conclusion that the imposition of an equality constraint was not justified, and thus the
unconstrained four-factor model is more informative. These findings are taken as “evidence against the hypothesis that four distinct branch-level factors existed” (p. 234).

Gignac suggests that a general factor model with specific nested factors is best representative of the Mayer-Salovey-Caruso emotional intelligence construct. This model is based on the confirmatory factor analyses of Palmer et al. (2005), conducted with MSCEIT scores from 450 members of the Australian public, and with the original Mayer et al. (2003) data. In addition to this model, Palmer et al. also assessed the viability of five other models, which included one- and two-factor models representing the general factor, and the experiential and strategic area factors from Mayer et al., respectively. For both sets of data (Mayer et al., 2003; Palmer et al., 2005) chi square and all close-fit indices for the one-factor model indicate a non-satisfactory level of fit, however all subtest factor loadings were positive and significant and the authors concluded that there was some indication that a general factor existed based on MSCEIT subtest covariations. The two-factor model yielded a chi-square statistic which was significantly better fitting than the one-factor model ($\Delta \chi^2 = 26.52$, $p<.001$) but, as with the one-factor model, close-fit indices for the two-factor model indicate that it was not a well-fitting model. Palmer and colleagues also tested a four-factor model representing the four Branches of the EI ability model and found acceptable chi-square values ($\chi^2(14) = 16.65$, $p<.276$), and close-fit indices (CFI = .97; RMSEA = .02). However some of the factors were highly intercorrelated ($r = .90$) and in addition this model was no better fitting than a similar three-factor model which loaded the
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Assimilating/Facilitating Emotions subtests and the Managing Emotions subtests on the same factor.

Palmer et al. (2005) subsequently tested the fit of a general factor model with four nested factors representing the four Branches of the EI ability model and despite acceptable chi-square statistics and goodness-of-fit indices for the model, the Assimilating emotions subtests did not load at all, and so the model was not acceptable. The final hierarchical model tested by Palmer and colleagues represents a general factor model with a nested orthogonal Perceiving Emotions factor, and two nested oblique factors (Understanding Emotions and Managing Emotions). This model was proposed a posteriori, and was based on the observation by Palmer et al. that although Assimilating Emotions subtests contribute to an overall EI score, they do not contribute to an independent first-order factor, therefore these subtests were dropped from this analysis. This model represents the optimal model tested by Palmer and colleagues as it best represents the covariance observed between the eight MSCEIT subtests, demonstrating positive and significant factor loadings, and acceptable close-fit indices and chi square values.

Rossen et al. (2008) later examined many of the same factor models as Palmer et al. (2005), and found that the optimum model proposed by Palmer et al. also provided the best fitting model in their examination of the MSCEIT scores of 150 undergraduate students from the US. Rossen et al. also replicated the findings of Palmer and colleagues with regards to the one- and two-factor models of MSCEIT subtest covariance. Specifically, they found that the one-factor model provided a poor fit to the data, but that all subtests loaded positively and significantly on the
factor, which was also interpreted by the authors as evidence for a general EI factor. The two-factor model was found to be significantly better fitting than the one-factor model ($\Delta \chi^2 = 30.11, p<.001$). This model nonetheless yielded a significant chi-square value ($\chi^2(19) = 46.68, p < .001$), and also non-satisfactory goodness of fit indices (e.g. CFI = .88, RMSEA = .09) which are less than the values specified by Hu and Bentler (1999) as indicative of acceptable model fit ($\text{CFI} \geq .90, \text{RMSEA} \leq .06$). This model was therefore interpreted as not well-fitting.

Rossen et al. (2008) also replicated the results of Palmer et al. (2005) when they found that the four-factor model representing the four Branches of EI demonstrated acceptable chi-square values ($\chi^2(14) = 14.09, p = .44$) and close-fit indices (CFI = 1.0 ; RMSEA = .01). This model also demonstrated significantly better fit than the two-factor model ($\Delta \chi^2 = 32.59, p<.001$). A hierarchical model representing a third-order general EI factor, two second order Area factors, representing Experiential and Strategic EI, and four first-order factors representing the four EI Branches was also evaluated as this model “is the most direct test of the MSCEIT scoring system, and additionally provides a means for evaluating the importance of including a Total score” (p. 1263). Although this model was associated with acceptable close-fit indices several factor loadings in excess of 1.0 indicated negative residual variance and so the model was deemed unsatisfactory.

**Summary of factor analysis research**

The factor structure of the Mayer-Salovey-Caruso EI ability model has been the focus of much research, through exploratory and confirmatory factor analysis.
conducted with the two published measures of EI ability, the MEIS and MSCEIT (Ciarrochi et al., 2000; Gignac, 2005; Mayer et al., 1999; Mayer, Salovey and Caruso, 2004a; Mayer et al., 2003; Palmer et al., 2005; Roberts et al., 2001; Rossen et al., 2008).

Mayer and colleagues in their earlier research maintained that there was general agreement that factor analysis of their EI assessments, the MEIS and MSCEIT could produce models reflecting a general emotional intelligence factor, two area factors which reflected the experiential and strategic EI areas of their model, and four branch factors reflecting the four EI branches individually (Mayer et al., 1999; Mayer et al., 2004a; Mayer et al., 2003). However, other researchers at that time maintained that the factor structure of EI ability measures such as the MEIS was less stable than one would expect for a measure of intelligence (Roberts et al., 2001). More recent research suggests that the factor structure proposed by Mayer and colleagues may not always provide the best fit to the data (Gignac, 2005; Palmer et al., 2005; Rossen et al., 2008). Differences observed in the factor structure of EI ability measures such as the MEIS and MSCEIT have prompted the developers of these measures to concede that their factor structure remains open for discussion (Mayer et al., 2008).

**Rationale**

Data for Study 1 are drawn from a sample of working men and women from various organisations throughout Australia. The participants in the Roberts et al. (2001) study and some of the participants from the Mayer et al. (1999) study were from organisational or work settings. The only other participant group from a non-
university population included in factor analytic research of EI ability measures was the sample of the general Australian public included in the Palmer et al. (2005) study. Research investigating the factor structure of EI ability measures using an organisational sample adds to the modest body of factor analytic research involving working populations.

Replication of factor analysis findings for the MEIS is useful not only to further address construct validity issues such as those raised by Roberts et al (2001), using an organisational sample, but it is also helpful in determining the generalisability of the EI ability construct. Parker, Saklofske, Shaughnessy, Huang, Wood and Eastabrook (2005) emphasise the importance of conducting research in emotional intelligence across different countries and cultural groups as this is “a critical issue for a construct linked with basic mental abilities” (p.217). The use of an Australian adult population in Study 1 will add to research about the EI ability construct already undertaken within this culture (Ciarrochi et al., 2000; Palmer et al., 2005).

Aim 1: Confirmatory Factor Analysis of the MEIS using an Australian Organisational Sample

The first aim of Study 1 was to explore the factor structure of MEIS scores from a sample of working Australians. Some researchers have suggested that one-, two-, and four-factor solutions can be modeled in confirmatory factor analysis and provide good fit to EI ability scores (Ciarrochi et al., 2000; Mayer et al., 1999; Mayer et al., 2003). Other researchers have argued that a hierarchical structure which incorporates a general factor, with nested first order factors better represents
the Mayer et al. (2003) data (Gignac, 2005), new data (Rossen et al., 2008) and a comparison of Mayer et al’s data and new data (Palmer et al., 2005).

Confirmatory factor analysis (CFA) will be conducted with data from Study 1 in order to determine the viability of the factor structures proposed in past research. Confirmatory factor analysis is deemed the most appropriate analytical approach, because the factor structures of EI ability measures such as the MEIS and MSCEIT have been investigated repeatedly (Mayer et al., 1999; Roberts et al., 2001), and in most recent studies, exclusively, (Gignac, 2005; Mayer et al., 2003; Palmer et al., 2005; Rossen et al., 2008) using confirmatory factor analysis.

Correlational Analysis of MEIS Subtests

**Hypothesis 1**

It is expected that MEIS subtest scores will exhibit positive manifold, that is, most subtests will be positively inter-correlated with each other. Correlational studies of psychometric tests examine the level of inter-correlation that exists between the tasks included in these tests. In the study of cognitive intelligence, one empirical finding has become well established, specifically that test scores on cognitive tasks demonstrate positive manifold. That is, test scores are positively inter-correlated with one another although to varying degrees (Horn & Cattell, 1966; Van der Maas, Dolan, Grasman, Wicherts, Huizenga & Raijmakers, 2006).
To illustrate, Horn and Cattell (1966), in developing their theory of fluid and crystallized intelligence, administered numerous ability tests to 297 adolescent and adult participants to assess thirty-one primary mental abilities. These thirty-one abilities were reduced to nine secondary factors following oblique rotation of their data set. They found that the majority of these nine factors were positively correlated with each other. Eight out of the thirty-six correlation coefficients involving these variables were negative, with only one coefficient significantly so. The total range of correlation coefficients for the nine ability variables was $r = -0.22$ to $r = 0.39$. The fact that the majority of ability variables were positively intercorrelated in this way, is cited as evidence that the secondary factors identified by Horn and Cattell demonstrate positive manifold, and thus satisfy a psychometric phenomenon often observed by researchers. “Positive manifold for intercorrelations among abilities is, of course, a well-established finding” (Horn & Cattell, 1966, p. 263).

Mayer et al (1999) cite evidence of positive manifold among MEIS subtest scores, in arguing that the MEIS meets the traditional standards for an intelligence. The majority of MEIS subtests (e.g. Faces Subtest) were positively correlated with each other, with the full range of correlation coefficients between $r = 0.00$ and $r = 0.68$ for subtest scores. Roberts et al. (2001) obtained very similar results to those reported by Mayer et al (1999), reporting a range of correlations between $r = 0.02$ and $r = 0.66$ for MEIS subtests.
Method

Participants

Study 1 had 231 respondents, 154 males and 77 females, who were assessed as part of selection, training, or career development and coaching programs conducted on behalf of Australian organisations. Data were also obtained from participants who had attended EI workshops arranged by their organisation. All participants underwent EI assessment as a part of these initiatives because the organisation had specified EI as important to the individuals’ roles. Informed consent was obtained through this process, with all participants agreeing that data could be used anonymously for research purposes. The mean age of the sample was 40.1 years, with a range of 21 – 62 years. Data were collected between January 2002 and May 2007.

Respondents represent a good cross-section of roles and industries in Australia. The majority of respondents (59%) worked in management or senior management positions such as CEO, CIO, General Manager, Managing Director, Business Unit Manager, Principal, Executive Director, Director and Managing Partner. Another 19% of respondents worked in ‘professional’ or ‘white collar’ positions such as Accountant, In-House Lawyer, HR Officer, Engineer, Office Manager, Senior Journalist, Logistics Officer, and Consultant. The remaining 22% of participants were individuals who had attended non-management workshops but had not identified their organisational roles. Nearly 25% of the participants worked in the West Australian public sector, primarily in local and state government departments. Sixteen percent worked for resource companies, with a further 12% working in
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commercial industries such as accounting, finance and banking. The human resources industry represented 7.4% of the sample, with the insurance and consulting industries contributing 3.0% and 2.6% respectively. One third of participants did not provide information on the industry in which they worked.

Table 1A

*Industries Represented in Study 1 (Percentages in parenthesis)*

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number</th>
<th>Number Female</th>
<th>Number Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA Public Sector: Local and State Government</td>
<td>57 (24.7%)</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Resources: Mining / Oil &amp; Gas / Energy</td>
<td>37 (16.0%)</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>Commerce: Finance / Accounting / Banking</td>
<td>30 (13.0%)</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Human Resources / Health, Safety and Environment</td>
<td>17 (7.4%)</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Insurance</td>
<td>7 (3.0%)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Consulting</td>
<td>6 (2.6%)</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Industry not reported nor identifiable</td>
<td>77 (33.3)</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>231</td>
<td>77</td>
<td>154</td>
</tr>
</tbody>
</table>
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**Table 1B**

*Organisational titles of Study 1 participants*

<table>
<thead>
<tr>
<th>Organisational Title</th>
<th>Overall Number</th>
<th>Number Female</th>
<th>Number Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Manager</td>
<td>43 (31.4%)</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Manager / Acting Manager</td>
<td>40 (29.2%)</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>CEO / CIO</td>
<td>12 (8.8%)</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Principal (Accounting)</td>
<td>12 (8.8%)</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Director / Acting Director</td>
<td>11 (8.0%)</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>General Manager</td>
<td>11 (8.0%)</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Managing Director / Partner</td>
<td>8 (5.8%)</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Accountant / Analyst</td>
<td>10 (10.6%)</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Senior Advisor / Officer</td>
<td>9 (9.6%)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Chief Engineer / Senior Engineer / Engineer</td>
<td>5 (5.3%)</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>HR Officer / HR Coordinator / HR Coordinator</td>
<td>5 (5.3%)</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Senior Consultant / Consultant</td>
<td>5 (5.3%)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Miscellaneous positions*</td>
<td>10 (10.6%)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Positions not reported</td>
<td>50 (53.3%)</td>
<td>27</td>
<td>23</td>
</tr>
</tbody>
</table>

* Miscellaneous Positions: Charter Operator, Deputy Registrar, In-House Lawyer (2), Logistics Officer, Maintenance Superintendent, Medical Entomologist, Office Manager, Pipeline Controller, Senior Journalist.
As some participants were individuals assessed as part of selection and coaching programs, details of industry level were not always provided by the organisation assessing or sponsoring the participant. Only selection criteria or coaching objectives and desired outcomes were specified. Please see Table 1 for more detail on the industries in which respondents worked, or would work in the case of selection candidates.

**Materials**

**MEIS – Version 1.3**

Version 1.3 of the MEIS is used in this study (Mayer et al., 1997a). This version of the MEIS is different to the MEIS versions used in the Mayer et al. (1997) and Roberts et al. (2001) studies. The MEIS version 1.3 represents the final version of this instrument which was developed, and this was the version released for commercial use. Since Study 1 involves a convenience sample of EI ability results from an organisational sample it includes the commercial measure available at the time, namely the MEIS version 1.3. The major difference between the version of the MEIS used in Study 1 and the version used in both the Mayer et al. (1997) and Roberts et al. (2001) studies, relates to the number of tasks (subtests) included. The version of the MEIS used in the Mayer et al. (1997) and Roberts et al. (2001) studies includes 12 tasks (see p. 17), whereas the version used in this study includes 8 tasks (see p. 35).
Figure 2: Multifactor Emotional Intelligence Scale (MEIS) Version 1.3

MEIS

BRANCH 1
Identify Emotion

Subscale
Faces: $S = 3, R = 6$
Stories: $S = 3, R = 7$

BRANCH 2
Use Emotions

Subscale
Synesthesia: $S = 5, R = 5$

BRANCH 3
Understand Emotions

Definitions:
- Blends Task $S = 6, R = 1$
- Progressions Task $S = 8, R = 1$

Subscale
Relativity: $S = 4, R = 5$

BRANCH 4
Manage Emotions

Managing one’s own emotions
Subscale $S = 3, R = 4$

Managing others’ emotions
Subscale $S = 3, R = 4$

S is the number of task stimuli or items in each subtest, that is, three faces to be assessed in Faces subtest. R represents the number of responses required in responding to each task stimulus, in other words, six responses for each face in the Faces subtest.
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The MEIS comprises a set of ability measures designed to estimate an individual's emotional intelligence by assessing performance on the EI tasks outlined below. The EI ability tasks represent the four branches of the Mayer-Salovey EI model outlined in the introduction.

Each task in the MEIS is comprised of either individual items or item parcels. As Mayer et al. (2003) explain: “A parcel structure occurs, for example, when a participant is shown a face (in the faces task) and asked about different emotions in the face in subsequent items. The items make up an item parcel because they are related to the same face, albeit each asks about a different emotion” (p. 99).

Scoring the MEIS for Study 1

Two scoring methods for EI ability measures such as the MEIS and MSCEIT are normally used. These methods, expert- and consensus-based, will be considered in more detail in Study 2, however a brief description of these scoring methods is warranted since scores generated for analysis in Study 1 are done so according to the expert-based method only. According to this method responses to items on an ability measure are assessed according to their level of agreement with what experts consider to be the best response. Consensus-based scores for items are derived by weighting scores according to the consensus responses of individuals who have taken the measure.

One cannot derive a range of consensus-based scores for items on the MEIS without weighting scores, according to percentage endorsement for example. If this was done using the responses of Study 1 participants, this would lead to positive
skew, whereby most people score highly because the most popular choices receive the highest weightings (MacCann et al., 2003). Consensus scoring could be achieved by comparing the responses of participants in Study 1 with the US consensus weights (i.e. Mayer et al., 1999). However one of the aims of the current research is to extend the findings of researchers such as Palmer et al. (2005), who have established Australian consensus-based scoring weights, by developing Australian organisational consensus-based scoring weights. This endeavour is undertaken later in Study 2.

For these reasons consensus scores are not derived in Study 1 to conduct a factor analysis of MEIS subtest scores as has been done by other researchers (e.g. Mayer et al., 1999; Roberts et al., 2001). Consequently the expert-based scoring criterion (Mayer et al., 1999; Roberts et al., 2001) was used to assess MEIS responses and it is these scores which are subsequently analysed.

**Expert Scoring:** Scoring responses according to an expert criterion was achieved by comparing participants’ responses for each item with the responses endorsed by two experts, Mayer and Caruso (from Mayer, Salovey & Caruso, 1999). If a participant selected a response for an item which was in the range of appropriate responses identified by Mayer and Caruso for that item, then the participant received a score of 1. Otherwise the participant received a score of 0 for their response. So for example, on an item with 5 response alternatives, if the two experts (Mayer and Caruso) had endorsed the first three response alternatives as appropriate and the respondent selected one of these alternatives, then the respondent would receive a score of 1 for that item. If the respondent selected one of the latter two response alternatives then they would receive a score of 0 for that
item. Scores were linearly summed to produce raw scores for subtests, and subtests were linearly summed to produce a total EI score, as per the MEIS user manual (e.g. Mayer, Salovey & Caruso, 1997b).

Assessments were conducted on office premises in various locations throughout Australia. All participants were directed by a test administrator to read the instructions printed in the MEIS. Participants then completed the MEIS in a quiet room with no distractions. Participants did so at either their place of work or at the site where assessments were conducted. In roughly half the cases, participants also completed other assessments as required by the initiatives in which they were involved (i.e. selection, coaching etc.). Biographical data such as participants’ age, gender and occupational level were also collected in many cases. In all cases MEIS data were collected individually that is, individuals were not tested as part of a group.

Data collection was entirely driven by the availability of respondents who had participated in the projects indicated above with which this researcher was involved. All data were subsequently stored on password encrypted Microsoft Excel spreadsheets, with hard copies of MEIS results kept in a locked filing cabinet.
Results

Figure 3 illustrates a normal distribution for total EI raw scores according to the MEIS expert-based scoring criterion.

Figure 3

*Histogram Illustrating Total EI Raw Scores for Study 1 Participants*

The mean total EI raw score for Study 1 participants was 97.11 with a standard deviation of 6.32. The mean total EI raw score for men was 96.92 with a standard deviation of 6.72, and for women the mean was 97.48 with a standard deviation of 5.46.
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Reliability

As Table 2 illustrates, subtest reliabilities were slightly lower than those reported by Mayer et al (1999) and Roberts et al (2001) in their investigations of the MEIS. Consistent with Roberts et al., reliabilities for the higher Branches of the model demonstrated the lowest coefficients.

Table 2

Means, standard deviations and coefficient alphas for expert-based scoring of MEIS subtests

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>α</td>
</tr>
<tr>
<td>Identify</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faces</td>
<td>.80</td>
<td>.12</td>
<td>.48</td>
</tr>
<tr>
<td>Stories</td>
<td>.86</td>
<td>.11</td>
<td>.61</td>
</tr>
<tr>
<td>Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synesthesia</td>
<td>.80</td>
<td>.12</td>
<td>.60</td>
</tr>
<tr>
<td>Understand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blends</td>
<td>.84</td>
<td>.16</td>
<td>.26</td>
</tr>
<tr>
<td>Progressions</td>
<td>.84</td>
<td>.15</td>
<td>.37</td>
</tr>
<tr>
<td>Relativity</td>
<td>.72</td>
<td>.10</td>
<td>.25</td>
</tr>
<tr>
<td>Manage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage Others</td>
<td>.78</td>
<td>.13</td>
<td>.27</td>
</tr>
<tr>
<td>Manage Self</td>
<td>.76</td>
<td>.13</td>
<td>.19</td>
</tr>
</tbody>
</table>

Note: SPSS 15.0 was used to calculate split-half reliabilities. Because SPSS computes split-half between the first and second half of items, MEIS subtests were re-sequenced so that the first half were odd items and the second half were even items.
At the Branch level, reliabilities were slightly higher with Spearman-Brown Coefficients ranging from $r = .34$ (Manage) to $r = .67$ (Identify). Spearman-Brown coefficients were calculated due to the heterogeneity of items across Branches. The full-scale split-half reliability for the MEIS was moderate ($r = .62$) and lower than the full scale reliability of $r = .96$ reported by Mayer et al. (1999). Total test reliability cannot be directly compared to that reported by Mayer et al. (1999) nor Roberts et al. (2001) as there are different numbers of items due to the fact that both Mayer et al. and Roberts et al. used twelve-subtest versions of the MEIS where this study used an eight-subtest version.

**Statistical Analyses**

In order to replicate previous research on the factor structure of an EI ability measure, this research initially evaluated the fit of 5 models. The first two models tested were a one-factor model representing a general EI factor (Model 1); and an oblique two-factor model (Model 2) representing the Experiential and Strategic areas of EI ability (e.g. Mayer et al., 2003). These models were evaluated to provide additional insight into the factor structure of the MEIS. Mayer et al (1999) and Roberts et al (2001) assessed the closeness of fit of three- and four-factor solutions for MEIS subtest covariance through confirmatory factor analysis. However one- and two-factor models of the EI ability construct were not tested by this method until the release of the MSCEIT (e.g. Mayer et al., 2003), although exploratory factor analysis of the MEIS suggested one- and two-factor models were viable (Ciarrochi et al., 2000). Testing these models completes the body of research regarding the factor structure of the EI ability construct prior to the release of the MSCEIT. The next model tested was an oblique four-factor model (Model 3) reflecting the four Branches of the EI ability model, as has been investigated by
others (Gignac, 2005; Mayer et al., 1999; Palmer et al., 2005; Roberts et al., 2001; Rossen et al., 2008).

The final two models tested were both hierarchical models. The first, Model 4, was based on the hierarchical solution presented by Rossen et al., specifying a third-order general EI factor, two second-order Area factors representing the Experiential and Strategic EI domains (Mayer et al., 2003), and four first-order factors representing the four Branches of EI ability. As observed by Rossen et al., this model represents the most direct test of the Mayer-Salovey-Caruso EI ability factor structure as it currently stands. The second hierarchical model tested was a nested factor model (see Palmer et al., 2005; Rossen et al., 2008), specifying a general factor model, and three nested factors which manifested subtests for the Emotion Perception, Understanding Emotions and Managing Emotions Branches (Model 5). Model 5 was selected as it represents the optimum factor structure observed in the Palmer et al. (2005) and Rossen et al. (2008) studies.

All models were tested through latent variable structural modeling using the LISREL 8.80 statistical software program (Jöreskog & Sörbom, 2006). The confirmatory models were specified such that subtests were hypothesized to load on one factor only. All CFA analyses were based on Maximum Likelihood Estimation (MLE) and covariance matrices. Differences between expected and observed covariance matrices were measured using the chi-square statistic \( \chi^2 \). An incremental close-fit index, the Comparative Fit Index (CFI) which is equal to the discrepancy function adjusted for sample size, was calculated for each model. CFI values have a range of 0 to 1 where a larger number indicates better model fit. Root Mean Square Error of Approximation (RMSEA), a measure of the residual in
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the model, was also calculated for each model. RMSEA values have a range of 0 to 1 where a smaller number indicates better model fit. As advocated by Hu and Bentler (1999), acceptable model fit is indicated by a CFI value of .9 or greater and a RMSEA value of .06 or less. All non-CFA analyses were conducted using SPSS 15.0 (Grad Pack).

Correlational and Factorial Structure of the MEIS

The subtest correlational matrix outlined in Table 3 provides some evidence of positive manifold, but it is not as strong as in previous studies, with correlations below the range obtained by Mayer et al. (1999) who found subtest tasks mostly correlated in the r = .10 to r = .40 range, and reported a full range of correlation coefficients between r = 0.00 and r = 0.68 for subtest scores. The range of correlation coefficients is between r = -.08 and r = .316 in this study, with subtests mostly correlated between r = .05 and r = .16.

Table 3

Correlation Matrix of MEIS Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Faces</th>
<th>Stories</th>
<th>Using</th>
<th>Blends</th>
<th>Prog.</th>
<th>Relativ.</th>
<th>Manage Self</th>
<th>Manage Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faces</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stories</td>
<td>.316**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using</td>
<td>-.007</td>
<td>-.020</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blends</td>
<td>.065</td>
<td>.020</td>
<td>-.082</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progressions</td>
<td>-.010</td>
<td>-.008</td>
<td>.111*</td>
<td>.155**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relativity</td>
<td>-.026</td>
<td>.050</td>
<td>-.058</td>
<td>.016</td>
<td>.116*</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing Self</td>
<td>.112*</td>
<td>.159**</td>
<td>.161**</td>
<td>.021</td>
<td>.122*</td>
<td>.084</td>
<td>.200**</td>
<td>-</td>
</tr>
<tr>
<td>Managing Others</td>
<td>.043</td>
<td>.068</td>
<td>.038</td>
<td>.052</td>
<td>.010</td>
<td>.069</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Significant at the .01 level (one-tailed)
* Significant at the .05 level (one-tailed)
Although not as substantial, the MEIS subtest intercorrelations in Study 1 show a similar pattern to the findings of other researchers in their examination of subtest intercorrelations for EI ability measures. For example, in their analysis of the MSCEIT Palmer et al. (2005) found that:

“each subtest correlated mostly highly [sic] with its sister subtest with which it combines (e.g. the Faces and Pictures subtests which measure Perceiving Emotions), with the exception of the subtests measuring Facilitating Emotions” (p. 296)

All subtests in Study 1 correlated most highly with their sister subtest(s), as Palmer et al. call them. The Synesthesia test, which as the only subtest for the Assimilating/Using Emotions Branch of the MEIS version 1.3 does not have a sister subtest was not included in these comparisons. These results are consistent with the pattern of intercorrelations described above by Palmer et al.

Results from this study also suggest that all subtests correlated significantly with their sister subtest with the exception of the correlation between the Blends and Relativity subtests of the Understanding Emotions Branch (r = .016), although both of these subtests were significantly correlated with a third sister subtest, Progressions (r = .155, p<.01 and r = .116, p< .05, respectively).

**Confirmatory Factor Analysis**

The factor loadings presented in Table 4 and model fit indices in Table 5 illustrate the one-factor model (Model 1), where one latent variable ‘General EI’ is manifested by the eight MEIS subtests. Subtests loaded positively but not all were significant as previous research with EI ability measures has found (Palmer et al.,
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2005; Rossen et al., 2008). This one-factor model produced a $\chi^2(17) = 35.02$, which is so large that the null hypothesis of a good fit is rejected at the .05 level ($p=.02$). The RMSEA value (.058) is small but the Comparative Fit Index (0.65) is also small. These results indicate that Model 1 shows a poor fit to the data.

Table 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>One-Factor</th>
<th>Two-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td><strong>Perceiving Emotions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faces</td>
<td>0.49*</td>
<td>0.46*</td>
</tr>
<tr>
<td>Stories</td>
<td>0.59*</td>
<td>0.69*</td>
</tr>
<tr>
<td><strong>Assimilating Emotions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synesthesia</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td></td>
</tr>
<tr>
<td><strong>Understanding Emotions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blends</td>
<td>0.08</td>
<td>-0.10</td>
</tr>
<tr>
<td>Progressions</td>
<td>0.06</td>
<td>-0.19</td>
</tr>
<tr>
<td>Relativity</td>
<td>0.08</td>
<td>-0.17</td>
</tr>
<tr>
<td><strong>Managing Emotions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing Self</td>
<td>0.30*</td>
<td>-0.62*</td>
</tr>
<tr>
<td>Managing Others</td>
<td>0.18</td>
<td>-0.31*</td>
</tr>
</tbody>
</table>

* significant at the .05 level
Table 5

*Goodness-of-fit indices for admissible CFA models (p values in parenthesis)*

<table>
<thead>
<tr>
<th></th>
<th>One-Factor</th>
<th>Two-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$</td>
<td>35.02 (0.02)</td>
<td>23.20 (0.23)</td>
</tr>
<tr>
<td>DF</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.65</td>
<td>0.93</td>
</tr>
<tr>
<td>Goodness of fit index (GFI)</td>
<td>0.96</td>
<td>0.98</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.058 (0.31)</td>
<td>0.026 (0.81)</td>
</tr>
</tbody>
</table>

In the oblique two-factor model (Model 2), it was hypothesized that the Faces, Stories and Synesthesia tasks would load on one factor, with all remaining subtests loading on the second factor. As Table 4 illustrates, the Faces and Stories subtests were the only subtests to load significantly on Factor 1, which represents the experiential domain of the EI ability model. The Managing Self and Managing Others subtests were the only subtests to load significantly on Factor 2, which represents the strategic domain of the EI ability model. Factor loadings for the Progressions and Relativity subtests were moderate though insignificant and the remaining subtests loaded weakly on their hypothesized factors.

The two-factor solution yielded a $\chi^2(17) = 23.2$, which was not statistically significant ($p = .23$) indicating that the model was excellent fitting. The RMSEA value of .026 is small and the Comparative Fit Index (0.93) is large, also indicating
a good fit. However, as Table 4 illustrates, half of the subtests did not load significantly on their hypothesised factors and therefore the model is not deemed acceptable. This model does show improvement over the one-factor model, and the better fit of Model 2 to the data, compared with that of Model 1, is statistically significant with $\Delta \chi^2 (7) = 11.82 \ (p<.05)$.

The oblique four-factor solution (Model 3) reflecting the four Branches of the MEIS yielded a non-positive definite matrix and failed to converge after the default number of iterations, and was not admissible. Therefore this model was not considered further within this analysis. This result is consistent with Palmer et al. (2005) who found that their oblique four-factor model was associated with a non-positive definite matrix. Because the four-factor model did not converge, the hierarchical factor model (Model 4) was not run in LISREL because four first-order factors were also specified in this model.

The nested hierarchical model (Model 5) which specified a first-order general factor and three first-order factors, with a covariance link between Factor 2 and Factor 3, and which represented the optimal model tested by Palmer et al (2005) and Rossen et al (2008), failed to converge after the default number of iterations. After increasing the number of iterations specified the model still did not converge and is not considered further in this analysis.
Discussion

Reliability of the MEIS

Coefficient alpha’s for MEIS subtests and Spearman-Brown coefficients for Branch and full-scale MEIS were lower than those reported previously (Mayer et al., 1999; Roberts et al., 2001). This is of particular concern since as Roberts et al. observe, this raises serious questions regarding the utility of providing scores to individuals who have completed the MEIS. This point is particularly relevant as respondents in Study 1 were administered the MEIS as part of selection and development initiatives, and in most cases received feedback on Branch and Total EI scores.

Mayer et al. (2001) acknowledge less than optimum reliabilities as a legitimate concern and indeed this was one of the reasons for the development of the MSCEIT. Psychometric studies of the MSCEIT indicate an increase in reliabilities at the subtest and Branch level where, subtest reliabilities range from $r = .64$ to $r = .88$, and Branch reliabilities range from $r = .79$ to $r = .91$ using consensus scoring and $r = .77$ to $r = .90$ using expert scoring (Mayer et al., 2003). As such, Mayer et al. (2001) consider the reliability issue raised by Roberts et al. (2001) to be a limited problem, and one that has been addressed with the release of the MSCEIT. Given the improvement in reliabilities demonstrated by the MSCEIT over the MEIS, this author is inclined to agree that this is a criticism of EI ability measures which has now been adequately addressed.
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Factor Structure of the MEIS

Correlational Evidence for MEIS factor structure

MEIS subtests in this study demonstrated a positive manifold of intercorrelations, albeit a lower range of correlations than previously reported (e.g. Mayer et al., 1999; Roberts et al., 2001). Positive manifold has been a phenomenon long associated with tests of mental ability (Austin, 2005; Horn & Cattell, 1966; Mayer et al., 1999), because such a positive matrix of intercorrelations has been evidenced as an indicator of a general intelligence factor believed to subsume mental ability tests (e.g. Spearman, 1904).

Of the 28 possible intercorrelations involving MEIS subtest z-scores, 21 correlation coefficients were positive. Although positive correlations between subtests from different Branches were not frequently significant, an assessment of positive manifold, as exemplified by previous studies (e.g. Horn & Cattell, 1966; Mayer et al., 1999), does not specify that most of these correlations need be significant, just positively correlated. Therefore, intercorrelations among MEIS subtests do suggest some evidence of positive manifold, albeit not as compelling as the evidence that intercorrelations among other tests of mental ability provide, as researchers have noted (Roberts et al., 2001).

Confirmatory analysis regarding the structure of the MEIS

With regard to the one-factor general emotional intelligence model tested, the confirmatory factor analysis (CFA) results of this study are consistent with recent
research, with the exception of the factor loadings reported for the general factor model. As Rossen et al. (2008), Palmer et al. (2005), and Gignac (2005) found, the general factor model in this study representing ‘General Emotional Intelligence’ (Mayer et al., 1999) produced chi-square values so large that the null hypothesis of a good fit was rejected and all other close-fit indices fell outside the range advocated by Hu and Bentler (1999). The factor loadings for the one-factor model were positive for all subtests, however all subtests did not load significantly on the general factor. Unlike previous research where all subtest factor loadings have been both positive and significant on the general factor (Palmer et al., 2005; Rossen et al. 2008), results from Study 1 indicate that only the factor loadings for the Faces, Stories, and Managing Self subtests were large enough to be significant. Therefore, unlike previous studies, results from CFA analysis of a one-factor general model in Study 1 cannot be interpreted as providing substantial support for a general emotional intelligence factor.

The oblique two-factor model (Model 2) representing the Experiential and Strategic domains of EI ability (Mayer et al., 2003), showed a better fit to the data ($\Delta \chi^2 = 11.82, p<.05$) than the one-factor general model (Model 1). However despite acceptable, chi-square, RMSEA and CFI values, half of all subtests (Synesthesia, Blends, Progressions and Relativity subtests) did not load significantly on their hypothesized factors.

The pattern of factor loadings is similar to the factor loading patterns observed in exploratory factor analyses of previous MEIS research conducted by Mayer et al., (1999) and Ciarrochi et al. (2000). Both of these studies produced models which differentiate between subtests from the Perceiving Emotions Branch of the MEIS
and subtests from the Understanding and Managing Emotions Branches. In observing this distinction statistically, this research was consistent with the EI ability model which differentiates between higher- and lower-order Branches in terms of a levels-of-information processing hierarchy (e.g. Mayer et al., 2000; Mayer et al., 2001). However in Study 1, only subtests for the Perceiving Emotions Branch of the MEIS loaded significantly on their hypothesized factor, which represented Experiential EI (Mayer et al., 2003). Moreover, only subtests for the Managing Emotions Branch loaded significantly on their hypothesized factor, representing Strategic EI (Mayer et al., 2003). These factor loadings therefore suggest a more restrictive range for the Experiential and Strategic EI domains. An improvement in the degree of fit to the data from Model 1 to Model 2, yet the rejection of Model 2 as a good fit to the data, is consistent with the prior confirmatory factor analysis research of Palmer et al. (2005) and Rossen et al. (2008).

Confirmatory factor analysis of an oblique four-factor model representing the four Branches of the MEIS yielded a non-positive definite matrix and failed to converge after 50 iterations, and thus the model is deemed inadmissible in structural equation modeling analysis. Consequently it was decided not to test the hierarchical model which also included four first-order factors in its analysis (Model 4). The attempt to test the nested hierarchical model with a first-order general factor and three first-order nested factors representing Perceiving Emotions, Understanding Emotions and Managing Emotions (Model 5), was similar and this model did not converge despite relaxing iteration constraints.
Rossen et al. (2008) and others (Gignac, 2005; Palmer et al., 2005) have argued that as the optimal model among those compared, this nested hierarchical model is evidence that EI ability measures lack structural fidelity. That is, that EI ability measures do not assess what the underlying theory of EI ability suggests they should measure, which is “a necessary but not sufficient condition for construct validity” (Rossen et al., p1268). They conclude that these findings underscore the need for revision of the EI ability model or the tests that were designed to assess EI, or indeed both of these. This research failed to replicate the results of Palmer et al. and Rossen et al., largely due to the production of non-positive defined matrices by this model.

This is an issue which has plagued researchers in this area due to the limitations of a factor solution based on only two observed variables for each latent variable studied (Gignac, 2005; Mayer et al., 2005). As Palmer et al. (2005) observe, “It is well known that models with ‘two indicator factors’ tend to create problems with respect to the production of non-positive definite matrices which are technically inadmissible in SEM” (p. 303). This effect, or violation of a three-indicator rule (Bollen, 1989), is based on the fact that factors do not meet a minimum requirement of three variables required to define a first-order factor. This is because there are only 8 subtests representing the 4 Branches of the MSCEIT, where 12 subtests are technically required. It is the same case for the version of the MEIS used in Study 1 since it contains 8 subtests representing the four Branches of the MEIS. This issue is likely what produced the non-positive definite matrix in the four-factor and nested hierarchical solutions tested in Study 1. This highlights the limitation of using a version of the MEIS which contains only 8 subtests, where others have used MEIS versions with 12 subtests. The issue is
compounded further by the fact that the ‘Using Emotions’ Branch of the MEIS in this study is represented by only one subtest (Synesthesia). However, as indicated earlier, the eight-task version of the MEIS represents the final version released for commercial use and was therefore the only version available for use in Study 1.

In order to address this issue, Palmer et al. (2005) recommend the development and inclusion of additional subtests, with a minimum of three per Branch (although Gignac (2005) states that there is a strong argument for a minimum of four). Mayer et al. (2005) suggest that a better way might be to further divide the existing subtests into item parcels or “item testlets – sets of items with common stems that can be analysed using item-response models or item-level factor analytic approaches” (p. 237). They suggest that until this is done, the final selection of an appropriate factor model representing their theoretical EI ability model should be postponed. In light of the non-positive definite matrices produced in Study 1 when testing more complex models including multi-factor models, one or both of these approaches is warranted if the factor structure of EI ability measures is to be assessed more comprehensively in the future.
Study 2: Scoring, Gender, and Personality issues relating to EI

Introduction

Study 2 has three aims which, for the most part, are a continuation of the psychometric evaluation of the MEIS which was begun in Study 1. The first aim is to examine the psychometric convergence of the two scoring methods (expert- and consensus-based scoring) used with the MEIS. As discussed in Study 1, one of these methods (consensus-based scoring) uses the responses of a group of people who have taken the MEIS to generate weighted scores for each item, which can then be compared to the responses of subsequent MEIS respondents. Also as discussed in Study 1, using consensus responses to generate weighted scores for the same participants from whom these weighted scores were derived, results in positive skew. This is because the most popular response to an item will receive a high score and by default most people will score highly on that item because it is the most popular. For example, suppose one response to an item receives a weighted score of .78 meaning that 78% of respondents selected this response. If this scoring method is applied to the same sample used to derive the weighted score in the first place, then 78% of those people will receive a score of .78 for that item. If the weighted score for another item is .10 then only 10% of respondents will receive this lower score. Thus an inherent positive skew occurs when weighted scores are applied to the same group used to derive those scores. It is therefore logical to use the responses of participants from Study 1 to generate weighted scores for MEIS item responses, which can then be used to derive consensus-based scores for the MEIS respondents in Study 2. Study 2 will also develop an
argument that the type of scoring method adopted in assessing responses to the MEIS may differentially influence scores for females and males. Exploring gender effects for the MEIS therefore constitutes the second aim addressed in Study 2.

The third aim of Study 2 is to evaluate the discriminant validity of the MEIS by comparing it with the NEO-PI (Costa & McCrae, 1992). This aim is in response to the observation by some researchers that a significant relationship exists between emotional intelligence and personality, and therefore that EI measures do not exhibit strong discriminant validity when compared with personality measures.

**Scoring emotional intelligence ability measures**

One psychometric property of the MEIS which is considered in this study relates to its reliability, and specifically to how it is scored. Mayer et al. (2000) indicate that scoring of the MEIS was directly influenced by tests of emotional perception which were available in the early 1990’s, the time when Mayer and colleagues were formulating measures for their theory of EI. This is in part because from the outset, their theory of EI incorporated a component relating to emotional perception or monitoring (Mayer and Salovey, 1997; Mayer et al., 1999; Salovey & Mayer, 1990). Mayer et al. (2000) describe a test of emotional perception, the Affective Sensitivity Scale (Campbell, Kagan & Krathwohl, 1971), where respondents must indicate the emotions and thoughts involved in a series of interactions between characters portrayed in a video. Mayer and colleagues describe two methods commonly used to score participants’ responses to this test; these eventually became the two scoring methods for the MEIS. These scoring methods are also used in two other tests mentioned by Mayer et al: the Profile of Nonverbal Sensitivity (PONS:
Rosenthal, Hall, DiMatteo, Rogers & Archer, 1979) and the Communication of Affect Receiving Ability Test (CARAT), a test of nonverbal receiving ability (Buck, 1976).

The first scoring method for the MEIS involves an expert criterion for which two experts, in this case two of the test authors, defined a range of appropriate responses for each emotion task item (Roberts et al., 2001). Respondents providing an answer to an item within the range of appropriate responses identified by the experts receive credit in calculating the score for the item. Responses outside this range do not receive credit. The second scoring method specified by Mayer and colleagues is based on a criterion of general consensus, where the majority of test respondents define which response range is most appropriate for each item in the MEIS. The modal responses of respondents subsequently formed the criterion for scoring the test according to this criterion.

There is a third method known as target scoring, but this scoring method is only feasible on certain tasks, specifically those relating to emotional identification, where for example a ‘target’ is being rated by respondents for emotion in the target’s facial expressions, and subsequently the target is asked how they actually felt. The target’s rating thus serves as the criterion for scoring the respondent’s rating. As MacCann et al. (2003) observe, a number of assumptions underlie this scoring method, namely that the targets are able to accurately express the emotion they are feeling and that this is reported accurately, and also that targets refrain from reporting only positive or prosocial behaviours when in fact they are experiencing something else. In any event, this latter scoring methodology was eventually dropped by Mayer and colleagues.
Mayer et al. (1999) originally found that four MEIS subtests, scored by expert and consensus scoring methods, correlated between $r=0.61$ and $0.80$ in their analysis of 503 participants comprising part-time and full-time college students, corporate employees, career workshop attendees, and executives. Not all subtests were analysed, but rather scores from subtests were randomly drawn, one from each Branch of the MEIS, and their inter-correlations were then calculated. Mayer et al. paired the modal consensus choice for each item of the subtests sampled (consensus response), with the specific expert selection for the corresponding items (expert response). Mayer and colleagues argue, based on this range of correlations, that the two scoring criteria are closely related.

Mayer et al. (2004a) report that expert and consensus scores for the MSCEIT correlate at $r=0.98$, and similar figures are reported by Palmer et al. (2005). The differences in expert/consensus scoring convergence demonstrated by the MEIS and MSCEIT are said to be due to the fact that only two experts were used to score the MEIS, whereas twenty-one experts were used in establishing expert scoring protocols for the MSCEIT. Thus, the MEIS with only two expert raters having to score nearly 2,000 test alternatives, is likely to show less convergence with consensus scores (Mayer et al., 2004a). This may be due to the fact that, within the context of expert-scored tests, experts often do not agree and a large number of experts are therefore required to generate a credible scoring method (Legree, 1995). However, this greater scoring convergence for the MSCEIT may be attributable to the fact that as the number of experts used increases, a new consensus group is established. This new consensus group by statistical default should correlate more significantly with the original consensus group than do the two experts used to score the MEIS.
Roberts et al. (2001) found similar Branch score correlations to those reported by Mayer et al. (1999) in their examination of 704 US Air Force trainees using the MEIS. They derived consensus-based scores for this sample using the consensus weightings from the Mayer et al. (1999) study, and similarly derived expert-based scores from the same study. Roberts and colleagues observed moderate to strong correlations between expert and consensus scoring methods on three of the four Branches of the MEIS: Using Emotions ($r=0.66$); Understanding Emotions ($r=0.78$); Managing Emotions ($r=0.43$); and overall EI score ($r=0.48$). The only Branch where expert and consensus scores were not at least moderately correlated was Identifying Emotions ($r=0.02$).

The low correlation between expert- and consensus-based scores for the Identify Branch was attributed to a modest negative correlation ($r = -.22$) between the two scoring methods for the Faces subtest of the MEIS, the first subtest of the Identify Branch. There is one possible explanation for why experts’ ratings for the facial expression of emotion may differ from consensus ratings. For example, Ekman (2001) specifies eight facial behaviours out of 20 behavioural criteria with which one must be familiar in order to maximise one’s chances of detecting a lie, and asserts that identifying these facial cues is something that very few people do at better than chance levels. Thus one can argue that people are not particularly adept at ‘reading’ facial expressions. Some of these facial expressions have an emotional component. One such example is ‘duping delight’ – a facial expression involving happiness at the prospect of fooling or duping the person being lied to. So it appears that people may not be particularly successful in identifying certain
facial expressions which communicate emotion. In contrast, expert ratings of emotion in facial expressions have developed to the extent that it has been argued that objective assessment of emotion in facial expressions using veridical criteria is now possible (Petrides & Furnham, 2003). It is perhaps not surprising therefore to discover that expert and consensus evaluations of emotion in facial expressions do not always converge.

Roberts et al. (2001) extended their analysis to include MEIS subtest correlations due to the variation in branch correlations. They concluded that there was a lack of convergence between expert and consensus scoring. This lack of convergence between expert and consensus scoring reported by Roberts et al. has been acknowledged as “unsettlingly different” by the MEIS authors (Mayer et al., 2004a, p.200). If Roberts et al. (2001) are correct and there is a lack of convergence between consensus and expert scores, then this raises the question of whether one can in fact determine a correct answer on a test of EI ability.

A measure in which the responses provided by test takers differ systematically and significantly from the responses the authors of the measure deem to be appropriate would have little utility. Moreover, an ability test using expert scoring criteria (i.e. any test of mental ability) where test takers systematically disagree with the test’s authors about the correct responses to items, would exhibit consistently low test scores. Thus a ‘floor effect’ confound would be evident, as most responses are judged incorrect.
The effect of cross-cultural variables on scoring EI ability measures

The MEIS used in this study can be scored according to expert or consensus scoring criteria, where the experts are from the U.S. Although it has been argued (e.g. Ekman & Rosenberg, 1997) that areas such as emotional expression are universal and can be measured accordingly, other research suggests that there are cross cultural differences in regard to emotion recognition. For example in the meta-analysis conducted by Elfenbein and Ambady (2002), the researchers discovered a significant “in-group advantage” (p. 205) whereby members of a cultural group displayed greater accuracy in recognising emotions if those emotions were expressed by members of the same cultural group. In addition it was found that within cultures, those members representing a minority group demonstrated greater accuracy in recognising the emotions expressed by majority group members compared with the accuracy of majority members in recognising minority group members’ emotions. This effect was so pronounced that minority members were often better at recognising majority group members’ emotions than they were at identifying their own emotions.

Gardner’s (1983) theory of multiple intelligences states that intelligences reflect what is valued by a culture and therefore might be represented differently across populations. The question therefore is whether expert scores for the MEIS demonstrate the same convergence with consensus scores reported by Mayer and colleagues when an Australian working group is used to derive consensus-based scores.
Roberts et al (2001) argue that “the adequacy of consensus judgments is based on evolutionary and cultural foundations, where the consistency of emotionally signaled information appears paramount” (p. 203). They maintain that consensus may be influenced by non-veridical cultural beliefs such as the "stiff upper lip" mentality of the British in the face of emotional problems, and one could add the “she’ll be right” attitude of Australians in the face of similar emotional issues, in concluding that there are serious concerns about bias in consensus judgment.

The use of an Australian working population in Study 2 will add to information from studies involving the scoring of EI ability measures undertaken within different settings. As previously discussed, it was not possible to generate consensus scores for the MEIS in Study 1 as this would have involved weighting scores based on the percentage endorsement of the Study 1 sample and then scoring individuals from this sample according to these weighted scores. This would inevitably lead to the positive skew issue already discussed. This issue does not arise in generating consensus scores for Study 2 participants as these scores are derived using a different sample, namely the consensus responses of Study 1 participants.

Aim 1

To explore if Australian consensus-based scores and US expert-based scores for MEIS Branch scores generally converge. That is, if consensus and expert scores are significantly and at least moderately correlated across the majority of MEIS Branch scores.
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**EI and Gender**

A lack of research into the relationship between gender and EI ability has prompted recent recommendations from within the field of emotional intelligence to include more studies on the impact of gender on EI ability theories and EI ability measurement (Mayer et al., 2008). Additionally, gender effects with respect to negative or adverse impact on individuals who undergo EI assessment for an organisational purpose (e.g. job selection) has emerged as an area of concern in the literature. For example, Conte (2005), and Van Rooy et al. (2005a; 2005b) argue that more research in the area of gender and EI is required to ensure that the use of EI measures does not adversely affect job selection candidates. Study 2 will investigate if the organisational use of the MEIS is likely to contravene Australian equal employment legislation, specifically gender discrimination legislation.

Women score higher than men on EI ability measures when a consensus-based scoring method is adopted. For example, in a study of 291 undergraduate students, Brackett et al. (2006) found that women scored significantly higher than men on the MSCEIT when a consensus-based scoring criterion was used. Ciarrochi et al. (2000) similarly found a significant main effect for gender and MEIS scores using a consensus-based scoring approach, while Brackett and Mayer (2003) also report a significant gender difference in favour of females for the MSCEIT, with women scoring nearly one full standard deviation higher than men for total emotional intelligence. It is not made clear in the Brackett and Mayer (2003) study whether an expert- or consensus-based scoring criterion was adopted.
In studies that report both expert- and consensus-based EI scores, the relationship between gender and EI ability is less clear. Mayer et al. (1999) report a moderate difference of half a standard deviation in favour of females when consensus scoring is used on MEIS responses, and a 0.1 standard deviation difference in the same direction when an expert scoring system is employed, although these differences were not significant for either scoring method. More significantly, Roberts et al. (2001) found that females scored a quarter of a standard deviation higher on the MEIS than males when a consensus-based scoring criterion was used, even though 89% of respondents in their study were male. This difference was significant at the .05 level. However, when an expert scoring criterion was applied, males scored higher than females by one quarter of a standard deviation. This difference was also significant at the .05 level.

Thus, it is possible that scoring methods may influence, or indeed exacerbate, the direction of gender effects on EI measures, where women score higher than men when a consensus-based scoring criterion is used, with a less substantial gender difference in the same or opposite direction when an expert scoring criterion is adopted. This suggests something about the variability in Mayer et al.’s (1999) and Roberts et al.’s (2001) data sets. It is possible that differences in scores produced by the MEIS’ two scoring methods arise because the experts who established the expert criteria for the MEIS were both male. That is, it is possible that they selected responses which males consider to be appropriate responses to the EI ability items. If gender differences exist in the behaviour relevant to any item, arising, for example, from differences in the empathic ability of men and women (Petrides, Furnham and Martin, 2004), then those differences would not have been represented within the expert scoring method. In contrast, where the consensus
method is based on scores from a group of men and women, such variation in responses would likely be accommodated.

Palmer et al. (2005), in their study of 450 participants representing a cross-section of members of the Australian general public, found that females scored significantly higher than men on the MSCEIT, according to either an expert- or consensus-based scoring criterion. However, they expressed the same suspicion based on the same research just mentioned, namely that expert- and consensus-based scoring of the MEIS might vary as a function of gender. It is because of the concern regarding potential gender bias due to the differential effect of the two scoring approaches, that gender issues are explored in Study 2 rather than in Study 1.

**Aim 2**

This study will investigate whether potential gender differences arise as a consequence of the scoring method employed for the MEIS. Specifically, this research will investigate whether females score significantly higher on the MEIS when a consensus-based scoring criterion is adopted, than they do when an expert-based scoring criterion is applied.

**Emotional Intelligence and Personality**

Another criticism of emotional intelligence observed in the literature relates to the discriminant validity of EI measures. This criticism is based on the significant correlation observed between certain measures of EI and measures of personality. This correlation has been attributed by some researchers (e.g. Brackett & Mayer,
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2003; Daus & Ashkanasy, 2005) to the inclusion of items in EI measures whose content is very similar to the items included in personality inventories. It is important to explore the relationship between EI ability and personality because a new construct such as EI should explain variance in individual differences that is not accounted for by well established constructs such as personality measures.

An examination of the relationship between EI and personality also bears directly on the construct validity of EI, specifically the argument made by Mayer and colleagues that EI should be relatively distinct from personality traits or characteristics. Also, importantly to this study, one of the main distinctions raised in the literature between ability and ‘mixed’ or competency models of EI, is that measures of the latter have been found to correlate more with personality (e.g. Van Rooy et al. 2005a), and this difference is in part because of the inclusion of factors relating to personality and other individual differences, as argued by Mayer et al. (2001).

Mayer and Salovey (1997) distinguish between EI as an intelligence or set of skills, as opposed to a social trait or talent. The research of Mayer et al. (2000) is specific about the relationship between emotional intelligence and personality. They outline a broad hierarchical model of personality and its major subsystems (See Figure 4), which is arranged:

“primarily according to lower versus higher-levels of processing…Components at lower levels are generally divisible into motivational, emotional and cognitive groups. For example, an urge to eat is motivational, whereas a feeling of generalized fear is emotional. Mid-level components, such as emotional intelligence, involve the interaction between lower level groups, such as the interaction between internal emotional feelings and cognitive understanding. High level components, such as self-esteem, are representations of the personal and social worlds that synthesize the lower-levels of processing in more complex integrated fashions” (p. 398).
Within this model, emotional intelligence arises from an interaction between emotions and cognitions, and although EI can be placed within a framework as complex as personality, it remains relatively distinct from higher-order functions such as understanding oneself (Intrapersonal Quality) or knowing how to socialise (Interpersonal Quality). These functions are higher-order because they involve more complex levels of processing. Mayer et al. (2004a) further clarify the relationship between their EI theory and personality, by stating that their four branch model of EI reflects the level of integration that each branch of ability has with personality and its subsystems.

**Figure 4**

*A Broad Hierarchical Model of Personality and its Major Subsystems*

<table>
<thead>
<tr>
<th>Purpose of Subsystem</th>
<th>Level of Subsystem</th>
</tr>
</thead>
</table>
| SATISFYING INTERNAL NEEDS                     | HIGH
| SATISFYING INTERNAL NEEDS                     | Learned
| SATISFYING INTERNAL NEEDS                     | Models
| SATISFYING INTERNAL NEEDS                     | MIDDLE
| SATISFYING INTERNAL NEEDS                     | Interactive
| SATISFYING INTERNAL NEEDS                     | Functions
| SATISFYING INTERNAL NEEDS                     | LOW
| SATISFYING INTERNAL NEEDS                     | Biologically-
| SATISFYING INTERNAL NEEDS                     | Related
| SATISFYING INTERNAL NEEDS                     | Mechanisms
| RESPONDING TO THE EXTERNAL WORLD               |                            |
| INTRAPERSONAL QUALITIES                        |                            |
| Example: Understanding oneself                 |                            |
| INTERPERSONAL QUALITIES                        |                            |
| Example: Knowing how to socialise              |                            |
| MOTIVATIONAL & EMOTIONAL INTERACTIONS         |                            |
| Example: Blocked motives lead to anger         |                            |
| EMOTIONAL & COGNITIVE INTERACTIONS            |                            |
| Example: Understanding emotions                |                            |
| MOTIVATIONAL DIRECTIONS                       |                            |
| Example: Needing to eat                       |                            |
| EMOTIONAL QUALITIES                            |                            |
| Example: Being emotionally expressive         |                            |
| COGNITIVE ABILITIES                            |                            |
| Example: Ability to perceive patterns          |                            |

“Thus, the perception and expression of emotion (Branch 1), and the capacity of emotion to enhance thought (Branch 2) are relatively discrete areas of information processing that we expect to be modularized or bound within the emotion system. By contrast, emotion management (Branch 4) must be integrated within an individual’s overall plans and goals…which necessarily involves the rest of personality. That is, emotions are managed in the context of the individual’s goals, self knowledge, and social awareness” (p. 199).

Although EI, according to Mayer and colleagues, is part of personality and its major subsystems, and indeed may arise as a consequence of this system, as noted in the general introduction, Mayer et al (1999) made a conscious decision to keep their theory and measurement of emotional intelligence separate from constructs like personality. This is because they wanted to analyse the degree to which the two constructs independently contributed to a person’s behaviour and general life competence. Also noted in the general introduction is the observation that competency models of EI have not maintained such a distinction.

The relationship between emotional intelligence and personality

One way in which the relationship between EI and personality has been explored in the literature, is through correlational analysis involving measures of the two constructs. However, some researchers have argued that because much research has examined this relationship by collapsing mixed-model and ability theories and measures of EI, erroneous conclusions have been drawn (Daus & Ashkanasy, 2005). Specifically it has been argued that mixed-model or competency measures of EI correlate substantially more with personality than do ability EI measures (Mayer et al., 2008), and thus it is appropriate to study both types of EI measures separately when exploring the relationship between emotional intelligence and personality.
That mixed-model or competency measures of EI exhibit greater correlation with personality measures than do EI ability measures is borne out by research findings. For example Brackett and Mayer (2003) explored the intercorrelations among scores for the MSCEIT, Bar-On’s (1997) EQ-i, Schutte et al.’s (1998) SREIT, and the Big Five factors of personality, as represented by the NEO-PI-R (Costa & McCrae, 1992). The EQ-I correlated significantly with all five personality factors of the NEO-PI: Neuroticism \(r = -.57\); Extraversion \(r = .37\); Openness \(r = .16\), Agreeableness \(r = .27\) and Conscientiousness \(r = .48\). The SREIT correlated significantly with four of the NEO-PI factors: Neuroticism \(r = - .19\); Extraversion \(r = .32\); Openness \(r = .43\) and Conscientiousness \(r = .25\). However the MSCEIT was correlated with only two factors of the NEO-PI: Openness \(r = .25\); Agreeableness \(r = .28\). The consistently significant correlations for the two mixed-model or competency measures of EI suggest that such measures are less distinct from personality than are ability EI measures. This difference is attributed in part to:

“the distinct ways the constructs are defined. Many items on the EQ-i and SREIT, for instance, pertain to personality attributes such as optimism and emotional stability, which are unrelated to the four abilities assessed by the MSCEIT” (Brackett & Mayer, 2003, p. 1155).

MacCann et al. (2003) reviewed prior research to examine the degree to which mixed-model measures such as the Trait Meta Mood Scale (TMMS: Salovey, Mayer, Goldman, Turvey & Palfi, 1995), EQ-I (Bar-On, 1997) and Emotional Competence Inventory (ECI: Boyatzis & Goleman, 1999), correlated with personality measures. The ECI is a 360 inventory reflecting the emotional competencies developed by Boyatzis and Goleman (e.g. Boyatzis, Goleman & Rhee, 1999). The TMMS is a self-report measure assessing attention to emotion, clarity of emotion and repair of negative emotions. This assessment was an earlier
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attempt by Salovey et al. (1995) to measure emotional intelligence, before they operationalised EI as a set of ability tasks with the development of the MEIS (Mayer et al., 1997a). MacCann and colleagues classify the TMMS as a mixed-model measure. Although described by the authors of the TMMS as “a reasonable operationalization of aspects of emotional intelligence” (p. 147), it is clearly based on an earlier articulation of the Mayer-Salovey theory of EI. This is apparent in the wording of some of the items contained in the TMMS where there is obvious reference to personality facets. For example, the Mood Repair scale on the TMMS asks respondents to rate their level of agreement or disagreement with the following statements: “Although I am sometimes sad, I have a mostly optimistic outlook” (item 16); “When I am upset I realize that ‘the good things in life’ are illusions” (item 17); and Item 32 states: “Although I am sometimes happy, I have a mostly pessimistic outlook (pp. 152-153).

Across the studies reviewed by MacCann et al. (2003), the EQ-i scales demonstrated moderate to high correlations with the Extraversion (r = 0.46 to r = 0.56), Agreeableness (r = 0.01 to r = 0.43) and Conscientiousness (r = 0.33 to r = 0.51) factors of the NEO-PI (Costa & McCrae, 1992), and a strong negative correlation with Neuroticism (r = -0.62 to r = -0.77). This would suggest a moderate to strong relationship between such measures and personality. The TMMS scale displayed similar patterns of relationships but weaker correlations, and MacCann et al. (2003) argued that it showed promise in terms of discriminant validity.

In a review of data presented in the ECI technical manual, MacCann et al. (2003) report that ECI scales correlated moderately with the NEO-PI on Extraversion (r = 0.24 to r = 0.49) and Conscientiousness (r = 0.21 to r = 0.39), but interestingly
showed less correlation with Neuroticism ($r = -0.07 \text{ to } r = -0.20$) than the other self-report measures discussed. MacCann et al. (2003) conclude that conceptual and empirical evidence suggests that mixed-model or competency measures are a combination of well known constructs, and argue that these measures achieve little more than what personality assessments already accomplish.

In contrast, studies of Mayer and colleagues’ EI ability measures show that these measures are less related to personality. In an examination of expert- and consensus-derived scores, Roberts et al. (2001) found that the MEIS Branch scores demonstrated low correlations with Neuroticism ($r = -0.15 \text{ to } r = .07$), Openness ($r = 0.01 \text{ to } r = 0.20$), Extraversion ($r = -.11 \text{ to } r = .14$) and Conscientiousness ($r = -0.09 \text{ to } r = 0.08$), and low to moderate correlations with Agreeableness ($r = -.09 \text{ to } r = .29$). Total MEIS scores correlated between $r = -.18$ and $r = .24$ with the five personality factors when consensus scores were used to derive total EI, and between $r = -.03$ and $r = .15$ when expert scores were used.

Van Rooy et al. (2005a) conducted a meta-analysis on 58 studies (mostly peer-reviewed but also including some data from dissertations and technical manuals) involving EI measures, personality measures and cognitive measures. In an investigation of studies which had used the MEIS or MSCEIT, they found that there were no true score\(^1\) correlations between total EI and any of the ‘Big Five’ factors of personality in excess of $\rho = 0.20$ ($\rho = 0.06 \text{ to } \rho = 0.18$). The mixed-model or

---

\(^1\) True score correlations are calculated when conducting meta-analyses, specifically the Hunter and Schmidt (1990, 2004) meta-analysis method adopted by Van Rooy et al (2005a). Using this method, firstly the mean observed correlations are weighted according to the sample size of the studies from which they were taken. These weighted correlations are then corrected for sampling error and unreliability, yielding a true score correlation ($\rho$).
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competency EI measures examined in Van Rooy et al’s (2005a) meta-analysis, were the Emotional Intelligence Scale (Schutte et al., 1998), the EQ-I (Bar-On, 1997), the TMMS (Salovey et al., 1995) and the Emotional Competence Inventory ((ECI: Boyatzis & Goleman, 1999). True score correlations for mixed-model measures exceed $\rho = 0.30$ for four of the five personality factors ($\rho = 0.32$ to $\rho = 0.40$), with the exception being Agreeableness ($\rho = 0.27$). Van Rooy et al. (2005a) concluded that mixed-model or competency measures of EI were highly correlated with personality and ability measures were more distinct from personality factors.

However given that the highest true score correlation obtained between competency or mixed-model measures and personality factors was $\rho = .40$, it is probably more accurate to say that this represents a moderate correlation, based on Cohen’s (1988) classification of effect sizes.

Previous research indicates that ability EI measures such as the MEIS and MSCEIT correlate in the $r = .01$ to $r = .25$ range with the Openness factor, and in the $r = -.09$ to $r = .29$ range with the Agreeableness factor of the NEO-PI (Mayer et al., 2008; Roberts et al., 2001; Van Rooy et al., 2005a).

The fact that EI ability correlates significantly with the Agreeableness factor has been attributed to the fact that this factor includes empathic and interpersonally sensitive content. The Openness factor has been linked with intelligence through the argument that individuals who are open to information may exhibit higher IQ, and this argument has been used to explain why this factor also correlates significantly with emotional intelligence (Mayer et al., 2008).
Correlations between EI ability measures and the remaining factors of the NEO-PI have typically been lower, with Conscientiousness correlating in the .05 to .08 range, Extraversion in the $r = -.11$ to $r = .26$ range (Ciarrochi et al., 2000; Mayer et al., 2008; Roberts et al., 2001), and the Neuroticism factor in the $r = -.15$ to $r = .08$ range (Mayer et al., 2008; Roberts et al., 2001; Van Rooy et al., 2005a). Although, Matthews, Emo, Funke, Zeidner, Roberts, Costa and Schulze (2006) report a significant negative correlation between the MSCEIT general factor and the Neuroticism factor of the NEO-FFI ($r = -.23$). This is a similar result to that obtained by Roberts et al. (2001), who also found a significant negative correlation of $r = - .18$ ($p < .05$) between Neuroticism and total MEIS scores (consensus). Additionally, Mayer et al (2004a) report a significant negative correlation between total EI ability and the Neuroticism factor of the NEO with a weighted mean correlation of $M_w = .09$ ($p < .01$) obtained in an examination of results from 5 studies.

In a review of the literature on EI ability and personality conducted by Daus and Ashkanasy (2005), the highest single correlation observed between any EI ability Branch and a Big Five factor was between the Managing Emotions Branch and the Agreeableness factor ($M_w = .39$, $p < .01$). This correlation was observed in the review published by Mayer et al. (2004a), with the next highest correlation of $M_w = .28$ ($p < .01$) observed between the Managing Emotions Branch and the Openness factor of the NEO. These findings are consistent with the argument of Mayer and colleagues that this Branch is the most integrated with personality.
Summary of Personality Findings

The results from the literature reported here are consistent with the contention of Mayer et al (2000), that emotional intelligence as they define and measure it, although capable of being placed within a framework as complex as personality, still remains more distinct from personality than EI competency measures, as evidenced in comparisons with Big Five personality inventories. The level of overlap of mixed model EI measures with personality, it has been argued (e.g. Mayer et al., 1999, 2000), is less circumscribed, and this is an argument that receives substantial support from the psychological literature. EI ability measures are more distinct from personality measures, than are mixed models, where moderate to strong correlations between mixed EI measures and personality have been observed with weaker correlations for EI ability assessments and personality.

Although this type of study has been conducted previously, the study of EI and personality has, for the most part, been limited to university populations. The use of working Australians as a sample for this study will add to the modest database involving working groups. Understanding the relationship between personality and emotional intelligence with respect to organisational groups is important because these groups are likely to encounter a combination of personality and EI measures in a high risk setting, such as job selection.
Aim 3

The third aim of this study is to explore the relationship between an EI ability measure (MEIS) and a measure of personality (NEO PI). The following hypotheses are associated with this aim.

Hypothesis 1

Total EI scores for the MEIS will demonstrate only a moderate correlation with all five factors of the NEO PI-R, that is correlations are not expected to exceed $r = .3$ for any factor.

Aim 4

In addition, the fourth aim associated with this study is to examine if any of the four Branches of the MEIS are moderately to highly correlated with any of the Big Five factors of the NEO PI-R, that is if correlations exceed $r = .4$ between any Branch of the MEIS and any of the NEO personality factors.
Method

Participants

Participants in this study were 147 individuals, from various working backgrounds, who were being trained to work in the Australian mining industry, and who received personality and EI assessments as part of this training. As such the participants can be said to represent a convenience field sample. The participant group included 35 females and 112 males and the age range for participants was 19 to 55 years, with an average age of 31.5 years and a standard deviation of 7.9 years.

Materials

The materials used in Study 2 were:

- MEIS - As described in Study 1

Consensus Scoring: The consensus scoring method was based on the approach taken by previous researchers (Mayer et al., 1999; Roberts et al., 2001). The organisational sample from Study 1 provided the weights for each item used in the consensus scoring procedure for Study 2. Therefore, the response from each participant in Study 2 was scored according to its level of agreement with the consensus responses from Study 1. For example a participant in Study 2 who selected a response on an item which was endorsed by 70% of the Study 1 normative sample, received a weighted score of .7 for that particular item. A participant selecting an item response endorsed by 10% of the normative sample
received a score of .1, and so on. Scores were then linearly summed to provide a raw score for each subtest and Branch of the MEIS. Branch Raw scores were then summed to provide a composite EI score.

_Expert Scoring:_ As with Study 1, scoring responses according to an expert criterion was achieved by comparing participants’ responses for each item with the responses endorsed by Mayer and Caruso (from Mayer et al., 1999). If a participant selected a response for an item which was in the range of appropriate responses identified by Mayer and Caruso for that item, then the participant received a score of 1. Otherwise the participant received a score of 0 for their response. As with the consensus-based scoring criterion, scores were linearly summed to produce raw scores for subtest, Branch and composite EI.

- Revised NEO Personality Inventory (NEO PI-R), Form S (Costa and McCrae, 1992). A 240 item personality inventory incorporating the “Big Five” factors of personality.

_Procedure_

Participants completed the personality inventory and EI ability measure as part of a series of assessments conducted during their training to work in the Australian mining industry. The presentation order of assessment materials was the same, with each participant completing the NEO-PI followed by the MEIS. These assessments were conducted by a registered psychologist and in an environment used exclusively for psychological assessment purposes. Respondents were assessed between May 2005 and May 2007, and were assessed individually.
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*Informed Consent*

All participants read and signed a letter of informed consent which stated that the personality and EI data gathered could be used for statistical and research purposes, and that data would be de-identified should this occur.
Results and Discussion

Table 6

Means, standard deviations and coefficient alphas for consensus-based scoring of MEIS subtests

<table>
<thead>
<tr>
<th>MEIS Subtest</th>
<th>Current Study</th>
<th>Mayer et al. (1999)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Identify</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faces</td>
<td>.39</td>
<td>.04</td>
</tr>
<tr>
<td>Stories</td>
<td>.45</td>
<td>.06</td>
</tr>
<tr>
<td>Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synesthesia</td>
<td>.31</td>
<td>.05</td>
</tr>
<tr>
<td>Understand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blends</td>
<td>.58</td>
<td>.15</td>
</tr>
<tr>
<td>Progressions</td>
<td>.56</td>
<td>.13</td>
</tr>
<tr>
<td>Relativity</td>
<td>.36</td>
<td>.05</td>
</tr>
<tr>
<td>Manage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage Others</td>
<td>.36</td>
<td>.07</td>
</tr>
<tr>
<td>Manage Self</td>
<td>.29</td>
<td>.04</td>
</tr>
</tbody>
</table>

Study 2 means and standard deviations for consensus-based scores of MEIS subtests were very similar to those reported by Mayer et al. (1999). The internal consistency of Subtests was somewhat lower in Study 2 compared with Mayer et al., although not as low as the coefficients reported for expert-based scores reported in Study 1.
As Table 7 illustrates, composite consensus-based and expert-based MEIS scores were significantly correlated \((r = .79, p<.01)\). The magnitude of the correlation coefficients for the two scoring methods varied slightly by Branch. Based on Cohen's (1988) classification of effect sizes, the correlation coefficients were relatively high for the Using \((r = .84, p<.01)\), Understanding \((r = .84, p<.01)\) and
Managing Branches \((r = .73, p < .01)\), and moderate for the Identify Branch \((r = .55, p < .01)\). These correlations, indicated in bold in Table 7, are more consistent than the range of Branch inter-correlations reported by Roberts et al (2001) for the two scoring methods \((r = .02\) to \(r = .78)\).

Table 8

**MEIS Subtest Correlations for Consensus and Expert Scores**

<table>
<thead>
<tr>
<th>MEIS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Faces</td>
<td>.31**</td>
<td>.11</td>
<td>.11</td>
<td>-.06</td>
<td>-.03</td>
<td>.13</td>
<td>.05</td>
<td>.07</td>
</tr>
<tr>
<td>2. Stories</td>
<td>.15</td>
<td>.69**</td>
<td>.27**</td>
<td>.14</td>
<td>.19*</td>
<td>.10</td>
<td>.12</td>
<td>.15</td>
</tr>
<tr>
<td>3. Synesthesia</td>
<td>.09</td>
<td>.09</td>
<td>.84**</td>
<td>.10</td>
<td>-.01</td>
<td>.18*</td>
<td>.13</td>
<td>.32**</td>
</tr>
<tr>
<td>5. Progressions</td>
<td>.02</td>
<td>.19*</td>
<td>.09</td>
<td>.39**</td>
<td>.97**</td>
<td>.28**</td>
<td>.16</td>
<td>.02</td>
</tr>
<tr>
<td>6. Relativity</td>
<td>.08</td>
<td>.15</td>
<td>.19*</td>
<td>.03</td>
<td>.14</td>
<td>.64**</td>
<td>.26**</td>
<td>.14</td>
</tr>
<tr>
<td>7. Managing Others</td>
<td>.11</td>
<td>.14</td>
<td>.23**</td>
<td>.03</td>
<td>.11</td>
<td>.25**</td>
<td>.68**</td>
<td>.23**</td>
</tr>
<tr>
<td>8. Managing Self</td>
<td>-.14</td>
<td>.04</td>
<td>.15</td>
<td>.14</td>
<td>.03</td>
<td>.04</td>
<td>.17*</td>
<td>.71**</td>
</tr>
</tbody>
</table>

Note: Subtests scored by consensus method are located above the line, and subtests scored by the expert method are located below the line.

** Correlation is significant at the .01 level (two-tailed)
* Correlation is significant at the .05 level (two-tailed)
Table 8 presents the inter-correlations among the 8 subtests of the MEIS for consensus- (upper diagonal) and expert-based scores (lower diagonal). As the main diagonal (in bold) of Table 8 illustrates, seven of the eight subtests demonstrate moderate to high inter-correlations (Cohen, 1988) among the two scoring methods, with only a small inter-correlation observed for the Faces subtest.

These results are consistent with those obtained by Mayer et al (1999), who randomly selected four subtests, one from each Branch, in calculating inter-correlations among consensus- and expert-based scores. However only three of these inter-correlations (Stories and Managing Others) are comparable to the current study, as the remaining subtest (Feeling Bias) is not included in the version of the MEIS used in this study. Mayer and colleagues’ correlations for the Stories (r = .70), Relativity (r = .61) and Managing Others (r = .80) subtests are consistent with the results of this study. There are consistently higher inter-correlations among MEIS subtests reported in this study for the two scoring methods when compared with the findings of Roberts et al. (2001).

These results indicate a reasonably high level of correlation between what experts consider to be an appropriate response to EI ability items and what an Australian working sample considers to be appropriate responses for the same items.

**Discussion of Correlations between Consensus and Expert MEIS scores**

Scores derived from the consensus and expert scoring methods used in this study correlated between $r = .55$ and $r = .84$ across all four branches of the MEIS. These data are consistent with information presented by Mayer et al. (1999), where the
four Branch score correlations ranged from $r = .61$ to $r = .80$ (based on comparisons for one subtest from each Branch of the MEIS). This indicates at least a moderate relationship between expert-based scoring of the MEIS and the consensus of the 231 working Australians who participated in Study 1. These correlations are more consistent than those reported by Roberts et al. (2001), and contrary to their contention that correlations among consensus- and expert-based scores are widely varied across branches.

A similar pattern emerges for MEIS subtests with consensus- and expert-based scores correlating between $r = .31$ and $r = .97$ for the eight subtests of the MEIS. Again these results are different from the ones reported by Roberts et al (2001), who found correlations as low as $r = .09$ and $r = .12$ in their subtest comparisons for the two scoring methods, and even a modest negative correlation ($r = -.22$) for the Faces subtest. As with Roberts et al (2001), the lowest correlations between expert- and consensus-based scores in this study were observed for the Identify Branch ($r = .55$), although the correlation reported here is substantially greater than the one reported by Roberts and colleagues ($r = .02$).

Nonetheless, this suggests only a moderate relationship between expert and consensus judgments as to what constitutes the best answer for an item relating to emotional identification. From an examination of subtest correlations based on the two scoring methods, it is apparent that the lower correlation between expert and consensus responses for the Identify Branch is a result of the modest correlation ($r = .31$) between the two scoring methods on the Faces subtest. As Petrides and Furnham (2003) have observed, significant progress has been made in the area of facial recognition of emotion such that it is now possible to objectively score such
tasks according to veridical criteria. Given the modest level of agreement in this study between expert and consensus responses to these types of items, an expert criterion may therefore be preferable in scoring items relating to the facial expression of emotion.

Roberts et al. (2001), found difficulty in justifying both expert and consensus scoring of the MEIS, due in part to the limited psychometric convergence of these methods. The results reported here suggest that the two scoring methods converge moderately to strongly across all MEIS branches and most subtests, and both scoring methods are likely to produce comparable Branch and subtest scores, with the possible exception of the Faces subtest.

Unlike most previous studies which have used the consensus weightings of the original Mayer et al. (1999) study to derive consensus-based scores for participants, this study derived weighted scores based on the consensus of an Australian working sample (Study 1) and then compared these against the expert judgments of two of the authors of the MEIS in generating scores for Study 2 participants. This is an important distinction as the original Mayer et al. (1999) study included a sample which was “roughly representative of the ethnic composition of the United States census” (p.273). In terms of external validity it is important that the level of agreement between US experts and a US consensus group as to what constitutes an appropriate response for an EI ability item, is comparable to the level of agreement between the same experts and an Australian consensus group. This result is also important because concerns have been raised regarding potential cultural bias when consensus scoring methods are employed (Roberts et al., 2001).
Gender and Scoring of the MEIS

In order to examine potential gender interactions when these two scoring methods are adopted, a 2 (Gender) X 2 (Scoring Methods) repeated measures ANOVA was conducted with the data set, where ‘Scoring Method’ was included as a within-subjects factor and ‘Gender’ as a between-subjects factor. The results of this analysis are presented in Table 9. ‘Scoring Method’ were Expert- or Consensus-based scores. Alternative scores for one dependent variable were therefore entered as within-subjects factors for analysis: MEIS z-scores scored according to an expert-based scoring criterion and MEIS z-scores scored according to a consensus-based scoring criterion. MEIS raw scores were converted to z-scores, as the raw score means for the two scoring methods were not directly comparable.

A significant ‘Gender’ by ‘Scoring Method’ interaction was observed, F (1,144) = 6.93, p=.009. This interaction is illustrated in Figure 5. A post-hoc paired samples t-test of this interaction revealed that Females scored significantly higher for total EI (M = .17) when scored according to a consensus-based scoring criterion than they did when an expert-based scoring criterion was used (M = -.04), t(33) = 2.24, p = .03. Scores for Males when scored on a consensus-based criterion (M = .02) were not significantly different from expert-based scores (M = .08), t(111) = -1.34, p = .18.
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Table 9

*One-Way Repeated Measures Analysis of Variance*

<table>
<thead>
<tr>
<th>Effect</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.018</td>
<td>1</td>
<td>.018</td>
<td>.016</td>
<td>.901</td>
</tr>
<tr>
<td>Error</td>
<td>165.961</td>
<td>144</td>
<td>1.153</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scoring Method</td>
<td>.272</td>
<td>1</td>
<td>.272</td>
<td>1.840</td>
<td>.177</td>
</tr>
<tr>
<td>Gender* Scoring Method</td>
<td>1.025</td>
<td>1</td>
<td>1.025</td>
<td>6.927</td>
<td>.009</td>
</tr>
<tr>
<td>Error</td>
<td>21.310</td>
<td>144</td>
<td>.148</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To ensure that the imbalance in numbers between females and males was not problematic to the interpretation of results, the female sample was compared with a randomly selected male sample (i.e. N = 34). This analysis also produced a significant ‘Gender’ by ‘Scoring Method’ interaction (F (1,66) = 6.17, p = .016) and a plot quite similar to that for the larger group (see Figure 6).
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Figure 5

Mean z scores for MEIS scored by expert- and consensus-based criteria (N=146)
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Figure 6

*Mean z scores for MEIS scored by expert- and consensus-based criteria (N=68)*
Discussion of EI ability scoring and gender

Although this study found substantial convergence between the two scoring methods, a significant interaction between gender and scoring method was nonetheless observed. This interaction raises serious concerns with respect to using the MEIS’ expert-based scoring criterion. Women score significantly lower on the MEIS when an expert-based scoring criterion is used, than they do when a consensus-based scoring criterion is adopted. This is possibly due to the fact that the two individuals who provided expert scores for the MEIS were men, and their responses did not reflect potential differences in the way that men and women respond to EI items. Such differences may have been better represented when the consensus-based scoring method was adopted as there appears to be little difference between EI scores for men and women when this scoring method was used. However the comparable consensus scores for men and women observed in Study 2 runs contrary to previous research where it has been found that women score significantly higher than men when consensus-based scoring is employed (Brackett et al., 2006; Ciarrochi et al., 2000; Roberts et al., 2001). This may be due to the two-to-one ratio of men to women in the consensus group from Study 1. It is likely therefore that the gender by scoring method interaction observed in Study 2 would have been even larger had males and females been equally represented in this consensus group.

The MEIS’ successor, the MSCEIT includes 21 individuals as expert scorers, with 11 females among these experts. This issue does not appear to exist for the MSCEIT given the finding by Palmer et al. (2005) that females score higher than males when either criterion is adopted. However if someone is using the MEIS,
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given the interaction between gender and scoring methods observed in this study
and similar findings by other researchers (e.g. Roberts et al., 2001), and
considering the reasonably widespread use of EI ability measures in organisational
settings (MacCann et al., 2003; Van Rooy et al., 2005b), it would seem prudent to
score the MEIS according to a consensus-based criterion to avoid contravening
equal opportunity employment legislation.

**EI ability and Personality**

To examine the relationship between EI ability and personality, MEIS
subtest scores were correlated with NEO PI-R factor scores.

Table 10

*Correlational matrix of MEIS (Expert and Consensus Scores) and NEO PI-R Raw Scores (N=146)*

<table>
<thead>
<tr>
<th></th>
<th>Neuroticism</th>
<th>Extroversion</th>
<th>Openness</th>
<th>Agreeableness</th>
<th>Conscientiousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>Expert</td>
<td>-.09</td>
<td>.12</td>
<td>.02</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>Consen.</td>
<td>-.27**</td>
<td>.11</td>
<td>.08</td>
<td>.25**</td>
</tr>
<tr>
<td>Use</td>
<td>Expert</td>
<td>-.10</td>
<td>-.03</td>
<td>-.07</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Consen.</td>
<td>-.07</td>
<td>-.003</td>
<td>-.02</td>
<td>.02</td>
</tr>
<tr>
<td>Understand</td>
<td>Expert</td>
<td>-.23**</td>
<td>.03</td>
<td>.18*</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>Consen.</td>
<td>-.19*</td>
<td>-.05</td>
<td>.19*</td>
<td>.07</td>
</tr>
<tr>
<td>Manage</td>
<td>Expert</td>
<td>-.04</td>
<td>.03</td>
<td>.09</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>Consen.</td>
<td>-.18*</td>
<td>.10</td>
<td>.11</td>
<td>.18*</td>
</tr>
<tr>
<td>Total EI</td>
<td>Expert</td>
<td>-.20**</td>
<td>.05</td>
<td>.09</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>Consen.</td>
<td>-.28**</td>
<td>.05</td>
<td>.15*</td>
<td>.20**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (1-tailed).
* Correlation is significant at the 0.05 level (1-tailed).
Confirming Hypothesis 1, the correlational matrix presented in Table 10 shows that total EI scores (expert- and consensus-based) are minimally correlated with the five NEO-PI factors. The range of correlations in Table 10 is consistent with the correlations between total EI ability and personality factors observed in previous research (Brackett & Mayer, 2003; Daus & Ashkanasy, 2005; Van Rooy et al. 2005a).

In relation to Aim 4, no correlations between MEIS Branches and the Big Five factors exceeded $r = .3$. The Openness and Agreeableness factors had the highest positive correlations with total EI, and these correlations were significant for consensus-based scores. This result is consistent with studies reported by Mayer et al. (2008) and Van Rooy et al. (2005a), where the Agreeableness and Openness factors were found to have the highest positive correlations in studies of EI ability. The results from Study 2 are similar to those reported by Mayer et al. (2008) who cite significant correlations between total EI and Agreeableness ($r = .28$, $p<.001$) and Total EI and Openness ($r = .25$, $p<.001$). The results are also consistent with those reported by Ciarrochi et al (2000) who found a significant correlation between Openness to feelings and total EI scores ($r = .24$, $p<.01$) when an 8-item scale adapted from the NEO PI-R was used.

Neuroticism was significantly correlated with total EI scores for both expert- ($r = -.20$, $p<.01$) and consensus-based scores ($r = -.28$, $p<.01$). This result is consistent with previous research where the Neuroticism factor of the NEO-PI was found to be significantly negatively correlated with total EI scores (Matthews et al., 2006; Mayer et al., 2004a; Roberts et al., 2001).
At the Branch level, expert- and consensus-based scores for the Understanding Emotions Branch were significantly correlated with the Neuroticism factor (r = -.23, p<.01 and r = -.19, p<.05, respectively) and with the Openness factor of the NEO-PI (r = .18, p<.05 and r = .19, p<.05, respectively). The Identify Emotions Branch was significantly correlated (r = -.23) with Neuroticism and with Agreeableness (r = .25, p<.01) when a consensus-based scoring criterion was adopted. The Managing Emotions Branch was significantly correlated with both the Agreeableness factor (r = .18, p<.05) and with the Neuroticism factor (r = -.18, p<.05) when a consensus-based criterion was applied.

Discussion of the relationship between EI ability and personality

Results from Study 3 support the contention that EI ability is mostly distinguishable from the Big Five factors of personality, as argued by other researchers (Brackett & Mayer, 2003; Daus & Ashkanasy, 2005; Mayer et al., 2008). Emotional intelligence as measured by the MEIS represents a different construct to the Big Five factors of personality and as such demonstrates promising discriminant validity in relation to measures of the Big Five. As a relatively new construct this finding is important, as it distinguishes EI ability from already established constructs.

Also, there has been substantial criticism of EI theory and measurement due to the overlap observed between EI measures and Big Five measures of personality. As argued by Daus and Ashkanasy (2005) this criticism arises because of a ‘lumping’ together of the two predominant theories of EI, namely competency or mixed-models and ability models. The results from this study add to the growing body of
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evidence that EI ability is one aspect of personality which may fall outside the factor space of the Big Five, as Brackett and Mayer (2003) have suggested.

The idea that individuals with high EI might cope better with stress than their low EI counterparts, stems from the notion that those high in EI ability possess superior emotional skills, greater emotional knowledge and more effective emotional regulation. High EI individuals also employ more effective coping strategies such as eliciting social support and disclosing feelings to others (Salovey, Bedell, Detweiler and Mayer, 1999). Individuals high on Neuroticism also do not manage their emotions as well as others (Ciarrochi et al. (2000).

Although some prior research, and common sense, might suggest that individuals with high emotional stability might also be emotionally intelligent, this result is not predicted by the EI ability model as it currently stands. Mayer and colleagues appear to have now moved away from a link between EI and emotional stability factors in stating that EI ability measures should demonstrate minimal correlation with Neuroticism, as people can be smart about emotions whether or not they are emotional (Mayer et al., 2008). This is at least the third study (previously, Matthews et al., 2006; Roberts et al., 2001) which has found that there is a significant negative correlation between total EI scores and the Neuroticism factor of the NEO.

MacCann and Roberts (2008) argue that EI ability measures should:

“relate to variables or outcomes reasonably indicative of facility with emotions (coping with stress and lack of emotion-related disorders), demonstrating the appropriateness of the adjective emotional in emotional intelligence” (p. 541).
Since the Neuroticism factor of the NEO is widely used as an indicator of stress vulnerability (Costa, Somerfield & McCrae, 1996), the significant negative correlation observed in this study between total EI scores and scores on the Neuroticism factor of the NEO PI-R are more consistent with the viewpoint espoused by MacCann and colleagues. However since trait measures of negative affect such as the Neuroticism factor correlate only modestly ($r = .2$ to .4) with state or performance measures of affect (Matthews et al., 2006), it is perhaps more accurate to argue that there is a potential relationship between emotional intelligence and one’s typical emotional stability, rather than one’s capacity to cope with stress in performance settings. For a more detailed outline of the relationship between ability EI and stress-induced task performance (see MacCann & Roberts, 2008; Matthews et al., 2006).
Study 3: EI and Intelligence

Introduction

Study 2 investigated the discriminant validity of the MEIS by exploring, among other things, the relationship between EI ability and personality. Just as it is important to establish that EI ability is different from unrelated constructs such as personality, so it is important to ascertain whether EI ability converges with related constructs such as other mental abilities. Study 3 will therefore explore the relationship between the MEIS and another measure of intelligence, specifically verbal intelligence.

The classification of EI ability as an intelligence: Are there rules to emotions?

Some researchers contend that emotions have evolved because of their adaptive value in dealing with fundamental life tasks, such as threats, losses, achievements and frustrations (Ekman, 1994, p. 15). This functional element of emotions which allows us to relate and adapt to others and our environment is a theme common to emotion research. For example Levenson (1994), in outlining a functional theory of emotion, distinguishes between interpersonal and intrapersonal functions of emotions. Intrapersonal functions serve to organise complex subjective physiological and behavioural responses. Within Levenson’s model, emotions can activate behaviours within an individual which ordinarily occupy lower levels of
behavioural hierarchies, driving the pacifist to fight and the strong to weep under the proper conditions. “In this regard, emotion has the unique capacity to set aside, in a moment, a lifetime of individualized learning, refinement, culture, and style.” (p 124). Levenson thus asserts that emotions can short-circuit cognitive processing, in circumstances where such processing is ineffective or inappropriate, such as instances where one’s well being and integrity are under threat.

Establishing one’s position with respect to other people, ideas and objects represents one interpersonal function of emotion within Levenson’s theory. Emotions in this context help us to define our social networks, likes and dislikes, and our moral sense of right and wrong. Clore and Ortony (2000) outline a theory of emotion which is helpful in describing the involvement of emotions in this ‘positioning’. Part of this theory maintains that as humans, we are continually appraising situations for personal relevance. “This process involves an on-line computation of whether situations are or are likely to be good or bad for us, and, if so, in what way.” (p. 29). Clore and Ortony further describe this process as one in which the individual engages in a situational analysis involving goal, standard and attitude congruence. If an outcome associated with a goal is appraised as desirable then happiness and other pleasant emotions may be experienced. Anger and other unpleasant emotions are likely when outcomes are appraised as undesirable. Standards can evoke emotions within this model, for example, when the actions of another are appraised as exceeding or falling short of the moral, social, or behavioural standards and norms of the individual making the judgment. When an attitude is the source of the emotion, an object for example, may be appraised as appealing or unappealing. “Specific emotions are then differentiations of one or more of these three classes of affective reactions” (p 30).
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Frijda (1994) too outlines a functional theory of emotion which defines emotions, in part, as signalers of relevance for one’s well being or concerns: “They can be considered the mechanism whereby the organism signals to its cognitive and action systems that events are favorable or harmful to its ends” (p113). As with Clore and Ortony’s theory, Frijda contends that goals or “ends” (the author’s preferred term), are what provide an emotional event with its valence.

The second interpersonal function of emotion outlined by Levenson (1994) is Communication and Control. It is argued that characteristics of emotion conveyed in voice, face and body language serve an important function in communicating information on an individual’s emotional state and thereby influencing the behaviour of others. Levenson cites the capacity of one individual’s expression of fear to incite panic in a crowd, the capacity of a smile to defuse even the most dangerous situation, and the highly emotive power of a baby’s cry to elicit nurturing behaviours from others, in describing this form of functionality.

Ekman and Rosenberg’s (1997) research into emotions also examines the communicative functionality of emotion. The face is their principle focus for emotional expression and appraisal. They contend that when an emotion is experienced, that emotion is characterised by what are termed “reliable facial muscles”. Put simply, there are facial muscles, and hence expressions, which are difficult to manipulate independently of an emotion, and it is believed that an appraisal of these expressions can give accurate information on what emotion is being experienced. Over many decades, Ekman, Rosenberg and their colleagues have compiled a guide to these reliable facial expressions in their Facial Action...
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Coding System (FACS), and have published numerous validation studies of this system (Ekman & Rosenberg, 1997).

Of most pertinence to linking emotions to a concept like intelligence is that based on the work of some influential emotion researchers, there is an argument that emotions have rules which arise due to the adaptive value of emotions. Specifically, researchers have suggested that emotions can organise physiological and behavioural responses. Emotions can involve situational analyses incorporating an appraisal of goal, standard, and attitude congruence. Emotions have value in that they can communicate one’s emotional state and thus mobilize others to action, and it has been argued emotions can be reliably identified through an analysis of facial expressions, among other behaviours. Moreover, emotions can interrupt cognitive processing to direct one’s attention to where it is needed. In short, emotions have rules and a logical framework and can therefore be understood in a meaningful way. The logic, rules, and identifiable characteristics of emotion make it possible to argue that a person’s knowledge and understanding of such logic and characteristics can be assessed.

It is on this premise that Mayer et al. (1997) appear to have operationalised their model of EI. They developed a set of tasks designed to assess abilities that support the functional qualities of emotions. These include, amongst other things, emotional identification and understanding, and working with the logic of emotions.
The influence of cognitive intelligence research on EI theory and test development

In developing their definition and model of emotional intelligence, Mayer and Salovey were mindful of general cognitive intelligence theory, and their research can be seen to reflect the prior work of Wagner and Sternberg (1985). There are definitional similarities between the Managing Emotions branch of Mayer and Salovey’s EI model, and concepts such as tacit knowledge and the related functions of managing oneself and others which are described in Wagner and Sternberg’s model of practical intelligence.

In general, practical intelligence relates to successful performance in real-world activities, as opposed to academic or psychometric tests. One of the components of practical intelligence is tacit knowledge, a knowledge which is conscious, describable, and teachable but not normally taught to most people in a formal way (Wagner & Sternberg, 1985). According to the authors, tacit knowledge is important for success in professional or managerial careers. Tacit knowledge describes a capacity to manage oneself on a daily basis in order to maximise productivity. This includes task prioritisation, such as judging the relative efficiencies of approaching tasks in different ways, and knowledge about how to self-motivate in order to optimise achievements. Tacit knowledge also relates to what the authors call ‘managing others’, and is reflected in part, in knowledge about managing one’s own social relationships. This includes a capacity to generally get along well with others, and knowing how to reward others in a manner which maximises job performance and job satisfaction.
Gardner’s (1983) idea of an interpersonal intelligence is also noteworthy, in that it incorporates very similar language to the first Branch of Mayer and Salovey’s EI model, Identifying Emotions. Gardner’s interpersonal intelligence reflects “an ability to read people, empathise, and identify emotions in others” (Optimizing Intelligences: Thinking, Emotion & Creativity [VHS], 1998).

As Mayer and Salovey (1997) developed emotional intelligence theory at the conceptual level, they also acknowledged a connection to social intelligence theory:

“We thought that it might make sense to exchange emotional for social intelligence in [a] proposed triumvirate of intelligences. Emotional intelligence would combine a group of skills that were more distinct from both verbal-propositional and spatial-performance intelligence than social intelligence had been and at the same time would still be close enough to the concept of an intelligence to belong to the triad” (p. 8).

Thus Mayer and colleagues specifically describe mental abilities relating to emotional identification, emotional understanding and generating emotional states to solve problems, as well as selecting effective strategies for managing and working with emotions.

Mayer et al. (1999) argue that three criteria or traditional standards must be satisfied before a construct can be identified as an intelligence. The first is that it must be operationalised as a set of ability tasks. Mayer et al. operationalised their EI construct as a set of ability tasks reflecting the four branches of their EI model. The result was the Multifactor Emotional Intelligence Scale (MEIS: Mayer, Salovey & Caruso, 1997). Mayer et al argued that the MEIS’ factor structure was robust and demonstrated acceptable reliability, and therefore satisfied the first intelligence criterion. Mayer et al also demonstrated that the MEIS correlated moderately with
verbal intelligence, the extent to which one would expect measures of different intelligences to correlate. This fulfils the second criterion specified by Mayer and colleagues, that the MEIS should correlate with other measures of intelligence. MEIS scores were also found to increase from adolescence to adulthood, fulfilling the third criterion that EI should increase with age.

**Does EI ability correlate with other intelligences?**

One way of investigating whether emotional intelligence can be classified as an intelligence is to examine the relationship between measures of EI and measures of other intelligences. It has been argued by Mayer et al. (1999) that one of their measures of emotional intelligence, the MEIS, demonstrates a significant relationship with other measures of intelligence, but not so significant as would question the discriminant validity of the EI measure. In other words, Mayer and colleagues maintain that the MEIS and other cognitive measures should correlate with each other because they are both measuring intelligence, but this correlation should not be so large as to suggest that these measures are assessing the same type of intelligence.

Mayer et al. (1999) report moderate, yet significant ($p<.01$), correlations between overall EI as measured by the MEIS and verbal intelligence as assessed by the Army Alpha Vocabulary test ($r= 0.36$). This magnitude of correlation represents “the moderate level at which one would hope that a new domain of intelligence would be correlated with existing domains” (Mayer et al., 1999 p. 287).
Further support for a moderate relationship between EI and other tests of mental ability comes from meta-analytic studies. In their substantial meta-analysis of emotional intelligence literature, Van Rooy et al. (2005a) compared the results from 18 studies including 4000 individuals, in examining correlations between ability measures of EI and cognitive intelligence measures. They state that after correcting for unreliability, an estimated true score correlation of $\rho = 0.34$ was found.

Brackett and Mayer (2003) found that an EI ability measure, the MSCEIT, was correlated significantly with Verbal SAT scores ($r = 0.32$), and Roberts et al. (2001) also reported significant correlations between total MEIS scores and General (verbal-propositional) factor scores from the US Armed Services Vocational Aptitude Battery ($r = 0.27$). These results also support the concept of a moderate relationship between EI ability and intelligence, specifically verbal intelligence.

Mayer et al. (2008), in a review of EI research, contend that EI is correlated more with verbal intelligence than with perceptual/organisational intelligence, and this would seem an accurate statement in light of evidence from peer-reviewed psychological literature. For example, in addition to the significant correlation observed between verbal-propositional factor scores and MEIS scores, Roberts et al. (2001) also reported a significant but lower correlation between Mechanical (perceptual-organisational) and total MEIS scores ($r = .14$). Ciarrochi et al. (2000), in a study of Australian psychology undergraduates, found a low and non-significant correlation ($r = 0.05$) between MEIS scores and scores on Ravens Standard Progressive Matrices (ACER, 1989). Therefore non-verbal abstract reasoning ability is another intelligence, in addition to perceptual-organisational
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ability, which demonstrates lower correlations with EI ability scores, than the \( r = 0.30 \) correlations reported consistently in the literature between EI and verbal intelligence.

At the branch level, in a review of multiple studies, Mayer et al. (2004a) report that the highest correlation between EI ability and verbal intelligence was for the Understanding Emotions Branch (\( r = 0.40 \)), and the next highest correlation was between the Managing Emotions Branch and EI ability (\( r = 0.27 \)).

Rationale

Study 3 extends the examination of the validity of the MEIS that was begun in Study 1 and continued in Study 2. Study 3 examines the relationship between MEIS scores and scores on a verbal intelligence measure to establish whether the moderate yet significant correlations found in the literature are evident when working adults are studied. That is, Study 3 is concerned with extending the convergent validity findings of EI ability measures to an organisational or working context. Study 3 therefore complements Study 1, which considered the issue of validity in light of the factor structure of the MEIS, and Study 2 which investigated discriminant validity issues by comparing EI ability and personality measures.

The inclusion of a verbal intelligence measure in Study 3 is based on the logic that this type of measure represents the most rigorous test of the relationship between EI ability and other mental abilities. To elaborate, if a study were to find that EI scores did not correlate significantly with verbal intelligence scores, this would prove to be a more serious challenge to the convergent validity of EI ability than
the non-convergence of different mental abilities with EI. This is because verbal intelligence is consistently reported as significantly correlated with EI ability at about the $r = .30$ level, whereas other mental abilities such as perceptual/organisational ability and non-verbal abstract reasoning ability share lower and less significant correlations with EI ability (Ciarrochi et al., 2000; Roberts et al., 2001). Finding low or non-significant correlations between EI ability and mental abilities other than verbal intelligence, has not been considered a serious threat to the convergent validity of EI ability measures (Mayer et al., 2008). Whereas if verbal intelligence does not correlate significantly with EI ability, then one of the necessary criteria cited by Mayer et al. (1999) as a requirement for the classification of EI ability as an intelligence would not have been met.

**Hypothesis 1**

That ability EI as assessed by the MEIS will demonstrate a significant correlation with a measure of verbal intelligence, as has been reported consistently in the literature.

**Hypothesis 2**

Of the four Branches of the MEIS, the Understanding Emotions Branch will demonstrate the highest correlation with verbal intelligence.
Method

Participants

Participants from university and professional backgrounds took part in this study. In total, 45 individuals (15 females and 30 males) participated in the study. The mean age of individuals in Study 3 was 35.8 years. The 45 participants make up three separate groups; Entrepreneurs and Business Owners; MBA students; and a professional body comprising Lawyers, Accountants and general office staff (i.e. Office Managers and Assistants). Of the people in this latter group who provided information on their work, the majority (69%) were accountants and lawyers (See Table 10 for more detail on Study 3 participants).

These groups were sampled because they represented populations from an applied, as opposed to academic, setting. This was in response to the observation discussed previously that research involving such populations has been lacking in emotional intelligence research. The sample included in Study 3 contains only one university group, MBA candidates. This group is likely to be more representative of an applied population sample than most other university populations. This is because in order to gain entrance into the MBA program in question, candidates have demonstrated a minimum of two years commercial experience.
Table 11

Descriptive Statistics & Demographic Information for Study 3 Participants

<table>
<thead>
<tr>
<th>Group Number</th>
<th>Group Type</th>
<th>Age Range</th>
<th>Gender</th>
<th>Educational Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adv. Degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cert / Diploma</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H Sch. Dip or equiv.</td>
</tr>
<tr>
<td>Group 1</td>
<td>MBA Students</td>
<td>Range 25–64 yrs</td>
<td>Female 2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean 34.5 yrs</td>
<td>Male 8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Std Dev 10.7 yrs</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Group 2</td>
<td>Entrepreneur and Business Owners</td>
<td>Range 33–55 yrs</td>
<td>Female 2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean 41.1 yrs</td>
<td>Male 12</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Std Dev 6.8 yrs</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Group 3</td>
<td>Accountants, Lawyers and Office staff</td>
<td>Range 23–52 yrs</td>
<td>Female 11</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean 32.2 yrs</td>
<td>Male 10</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Std Dev 9.9 yrs</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>45</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

Note: Educational Levels are Advanced degree (Adv Degree), Degree, Certificate or Diploma Qualification (Cert/Diploma) and High School Diploma or equivalent (H Sch. Dip or equiv).
Participant Recruitment

In order to select a random field sample of participants, a letter was sent to HR Managers, Directors of Business units and board members from various West Australian companies and professional bodies, asking them to advertise within their organisation for participants who might be interested in participating in the study. A minimum number of 10 voluntary participants was requested to facilitate the collection of substantial data at one time, and that data collection could occur 'on-site' or at an external venue to be organised by the researcher. The same letter was also sent to a school of business at an Australian university. The letter informed participants that participation in the study was both voluntary and confidential and that confidential reports of personal results could be supplied on request from individuals (Please see Appendix 1 - Participant Recruitment Letter, for further details).

Representatives from the school of business and from the two other groups contacted this researcher, and indicated that they had received registrations of interest from at least 10 individuals looking to participate voluntarily in the study. An amenable time was subsequently arranged with each organisation/professional body to administer the study materials to participants.

Materials

The materials used in Study 3 were:

- MEIS - As described in Study 1
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- Acer Advanced Test (Second Ed.) – Form AL (Acer, 1978). A 29 item verbal reasoning measure (excluding example items)

The following are examples of the type of items included in the ACER Advanced test Form AL:

**Item Type 1**

Find the word that is closest in meaning to the word in heavy type.

<table>
<thead>
<tr>
<th>Mysterious</th>
<th>Exculpate</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ well-behaved</td>
<td>○ tragic</td>
</tr>
<tr>
<td>○ excited</td>
<td>○ imitate</td>
</tr>
<tr>
<td>● puzzling</td>
<td>○ astonishing</td>
</tr>
<tr>
<td>○ identify</td>
<td>○ omnipotent</td>
</tr>
<tr>
<td>○ blame</td>
<td>● exonerate</td>
</tr>
<tr>
<td>○ interrupt</td>
<td>○ elaborate</td>
</tr>
</tbody>
</table>

**Item Type 2**

Four of the following words are alike in some way. Colour in the circles next to the other two words.

| ○ table          | ● towel           |
| ○ chair          | ○ cupboard        |
| ● man            | ○ bed             |
| ○ fugitive       | ○ escapee         |
| ○ evacuee        | ● prisoner        |
| ● enemy          | ○ truant          |
Item Type 3

Colour in the circle next to the word which fills in the blank.

Filthy is to Disease as Clean is to ________
- ○ dirty
- ○ illness
- ○ safety
- ● health
- ○ water

Battle is to Duel as Chorus is to ________
- ○ twins
- ● duet
- ○ selection
- ○ music
- ○ song

Item Type 4

Find the two statements which mean most nearly the same.

- ○ Time is a herb that cures all diseases
- ○ Anticipation is better than realisation
- ● Today is worth two tomorrow’s
- ○ To speed today is to be set back tomorrow
- ● There is no time like the present
Item Type 5

Find the two statements which together prove that “John is a good swimmer”.

- Bob goes to the baths every day
- John and Bob are friends
- Bob won last year’s swimming championship
- John beat Bob in a race last week
- John has challenged Bob to a race

The ACER Advanced test form AL demonstrates acceptable reliability with a Cronbach alpha value of $\alpha = .82$, based on a sample of 409 Year 11 students from Australian secondary schools. Principal components analysis with Varimax rotation yields a solution whereby all of the item types listed above load significantly on a ‘Verbal’ factor, with factor loadings ranging from .69 to .76.

Procedure

Participants were informed that the purpose of the study was to examine their emotional and verbal intelligence. Emotional Intelligence was described to participants as a concept originally developed by Drs. John Mayer and Peter Salovey. Participants were then informed that Mayer and colleagues defined EI as
the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth (Mayer and Salovey, 1997). Emotional intelligence was further described as consisting of four separate components or branches which could be measured (Mayer et al. 1999):

- **Perceiving and Identifying Emotions** - the ability to recognise how you, and those around you are feeling.

- **Assimilating and Using Emotions** - the ability to generate an emotion, and to then reason effectively with this emotion.

- **Understanding Emotion** - the ability to understand the components of complex emotions and a comprehension of emotional “chains”, how emotions change with different situations. Additionally, the ability to engage in different emotional relativity or what is commonly called empathy.

- **Managing Emotions** - the ability which allows you to successfully manage emotions in yourself and in others; to select the most appropriate emotional strategies in response to situations where people’s emotions are important.

The reason this was done was because participants were told that they would be completing an EI assessment based on this theory later, and so a very brief introduction to EI was provided by way of introducing what might be a new concept for them. It was thought that the concept of ‘emotional testing’ might seem daunting to some and in order to ensure that participants could provide proper informed
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consent, it was considered appropriate to provide a brief outline of the emotional intelligence theory relevant to the test participants would undertake.

Participants were told that they would be required to complete a published emotional intelligence scale followed by a published verbal intelligence measure. A verbal reasoning measure was used, because it represents one of the best assessments of verbal intelligence used in psychological research (Kline, 1993). Participants were also informed that the likely time required to complete the assessments would vary but that it was anticipated that no more than one hour of their time would be required.

Having outlined the study, participants were asked to confirm their willingness to take part, with the proviso that they could withdraw at any time, without prejudice (as outlined in the written consent form provided to each participant. Please see Appendix 2: Participant information and letter of Consent).

Participants were assured that all information provided during the study remained confidential and no names or other information which might identify those who participated would be provided to their organisation, other organisations, or would be used in any publication arising from the research. Individuals involved in the study were given the option of obtaining individual feedback on their assessments and were given specific (and confidentiality preserving) instructions on how this could be done. (Please refer to instructions contained in Appendix 3: Participant Feedback Instructions). The MEIS was then administered to participants, followed by the verbal reasoning measure.
Representatives from the school of business and the entrepreneur / business owner group stated that their preference was for ‘on-site’ administration of participant instructions and tests and at a time of their choosing. Participants from the remaining group were administered instructions and materials at a venue organised by the researcher. The three groups were administered instructions and study materials within a three month time period.
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Results

Table 12

Mean Scores for Study 1, Study 2, Study 3 and Mayer et al. (1999)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faces</td>
<td>.80</td>
<td>.39</td>
<td>.78</td>
<td>.35</td>
</tr>
<tr>
<td>Stories</td>
<td>.86</td>
<td>.45</td>
<td>.85</td>
<td>.46</td>
</tr>
<tr>
<td>Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synesthesia</td>
<td>.80</td>
<td>.31</td>
<td>.79</td>
<td>.31</td>
</tr>
<tr>
<td>Understand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blends</td>
<td>.84</td>
<td>.58</td>
<td>.73</td>
<td>.75</td>
</tr>
<tr>
<td>Progressions</td>
<td>.84</td>
<td>.56</td>
<td>.79</td>
<td>.60</td>
</tr>
<tr>
<td>Relativity</td>
<td>.72</td>
<td>.36</td>
<td>.72</td>
<td>.35</td>
</tr>
<tr>
<td>Manage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage Others</td>
<td>.78</td>
<td>.36</td>
<td>.76</td>
<td>.37</td>
</tr>
<tr>
<td>Manage Self</td>
<td>.76</td>
<td>.29</td>
<td>.71</td>
<td>.28</td>
</tr>
</tbody>
</table>

Note: Study 1 Consensus Means are not included for the reasons discussed earlier (i.e. Study 1 Method section)
As Table 12 illustrates, MEIS scores based on expert- and consensus-based scoring criteria were consistent across all three studies presented here and with the scores obtained by Mayer et al. (1999).

**Correlational Analysis**

Hypothesis 1 was confirmed, with total MEIS raw scores correlating significantly ($r = .41$, $p<.01$) with verbal reasoning raw scores when an expert scoring criterion was applied and $r = .48$ ($p<.01$) when EI scores were derived according to a consensus-based criterion. These results are consistent with the findings of Brackett and Mayer (2003) and Roberts et al., (2001), where significant correlations were found between ability EI scores, and verbal SAT scores and verbal propositional tests, respectively. It is also consistent with the original correlational validation conducted by Mayer et al. (1999), where MEIS scores were found to correlate with a verbal intelligence measure at the $r = .36$ level.

**Table 13**

*Verbal and emotional intelligence (expert) Correlations (N=45)*

<table>
<thead>
<tr>
<th></th>
<th>Total MEIS Raw Scores (Expert)</th>
<th>Identify Branch Raw Scores</th>
<th>Using Branch Raw Scores</th>
<th>Understanding Branch Raw Scores</th>
<th>Managing Branch Raw Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ACER Verbal Reasoning Raw Scores</td>
<td>.41 **</td>
<td>.14</td>
<td>.07</td>
<td>.35 **</td>
<td>.32*</td>
</tr>
</tbody>
</table>

** Correlation is significant at the .01 level (one-tailed)
* Correlation is significant at the .05 level (one-tailed)
Hypothesis 2 was also confirmed with expert- and consensus-based scores for the Understanding Emotions Branch of the MEIS demonstrating the highest correlation with verbal intelligence ($r = .35$, $p<.01$ and $r = .42$, $p<.01$ respectively). This result is consistent with previous findings (e.g. Daus & Ashkanasy, 2005; Mayer et al. 2004a). The next highest, and only other significant, correlation was observed for expert- and consensus-based scores for the Managing Emotions Branch ($r = .32$, $p<.05$, $r = .37$, $p<.01$ respectively). This result is also consistent with the findings reported by Mayer et al (2004a).
Discussion

The relationship between EI measures and Verbal Intelligence

A significant correlation between MEIS scores and verbal reasoning scores satisfies a necessary criterion specified by Mayer et al (1999) for the classification of EI as an intelligence. That is, total MEIS scores demonstrate a significant correlation with another measure of intelligence, but not such a high correlation as would raise an issue of discriminant validity. This finding is also consistent with the results of Brackett and Mayer (2003) and Roberts et al. (2001) who observed significant correlations between ability EI scores, and verbal SAT scores and verbal propositional test scores.

The fact that the highest correlation observed between EI and verbal intelligence was for the Understanding Emotions Branch is consistent with the argument posited by Mayer et al (2001) that this Branch is the most cognitively saturated. The Understanding Emotions Branch is described by Mayer et al (2001) as the central locus of reasoning about emotions and emotional information, including linguistic information, and of all EI Branches it is expected that this Branch will correlate the highest with cognitive intelligence.

Summary

The fact that EI ability scores correlate moderately and significantly with other measures of intelligence, such as verbal intelligence, can be taken as evidence
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that EI ability represents an intelligence. Classifying EI ability as an intelligence raises issues common to mental ability testing in general, such as adverse impact on minority groups and the possibility that the predictive validity of EI ability measures in selection settings may vary as a function of the emotional demands of the job. This research has added to the growing body of evidence linking EI with other mental abilities, and perhaps it is now time to move beyond the “Is EI ability an intelligence?” question, and explore issues which arise as a consequence of the classification of EI ability as an intelligence, such as those just outlined.

General Discussion

Evaluation of psychometric issues previously identified with EI ability measures

The three studies reported here were designed to further explore some of the major psychometric issues which have been identified in relation to the EI construct and in approaches to measuring this construct.

External Validity

The replication of previous psychometric investigations of an EI ability measure, in an organisational context is important in determining the generalisability of such measures and underlying theoretical construct. Studies 1, 2 and 3 included samples of participants from a variety of work and business backgrounds, and as such represent a series of applied studies. As previously discussed, calls for more
research with these types of populations have been plentiful in the literature due to a combination of factors.

There has been a lack of EI ability research conducted with working populations in general (Landy, 2005), and in particular when compared to the reasonably substantial body of EI ability research involving university populations, most frequently psychology students. Cultural norms relating to emotion may produce differences in the way a student population and work population respond to items on an EI ability measure (Gohm, 2004). Additionally, it has been suggested that university students, especially psychology students, represent individuals who may have attained a threshold of EI ability which may not necessarily be present in non-student populations (Freudenthaler et al., 2008). If there are differences between the two types of population then the further study of groups from applied and organisational settings is important as it will add to our understanding of EI ability, which has thus far been mostly developed based on studies of academic populations.

Ideally, both academic and organisational populations should be well represented in EI research, especially given the increasing use of such measures in organisations, and the often high-stakes nature of EI assessments in these settings (Van Rooy et al., 2005b). This research therefore contributes to a further understanding of some of the major issues in EI ability research, based on data from groups likely to be affected by such issues.
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Factor Structure

The first of these investigations was prompted by questions in the emotional intelligence literature regarding the construct validity of the EI ability model, particularly the stability of its factor structure as assessed through factor analysis of the model’s two measures, the MEIS and MSCEIT. Analyses in Study 1 attempted to complete the factor analytical investigation of the MEIS begun by Mayer et al. (1999), and continued by researchers such as Ciarrochi et al. (2000) and Roberts et al (2001). Although these prior studies investigated the closeness-of-fit of a four-factor model for the MEIS using confirmatory factor analysis, one- and two-factor models of EI were only suggested by exploratory factor analysis data and were not tested through confirmatory factor analysis at the time. Subsequent research tested one- and two-factor models of EI ability using MSCEIT scores and results of Study 1 were discussed in relation to this research. It was concluded that factor loadings in the one-factor model (Model 1) did not produce the same evidence of a general factor suggested by previous researchers such as Palmer et al. (2005) and Rossen et al. (2008). However chi-square and other close-fit indices were similar to the results reported by these researchers, and so the model was deemed a poor fit to the data in Study 1. Although the oblique two-factor model demonstrated a better fit to the data than the one-factor model, it was also deemed an unsatisfactory solution. Factor loadings for the two-factor model were consistent with previous research (e.g. Ciarrochi et al., 2000) in differentiating between higher-order and lower-order (with respect to levels of information processing) Branches of the MEIS.
One issue which arose in considering both the oblique four-factor model representing the four Branches of the MEIS, and the nested hierarchical model representing the optimal model reported by Palmer et al. and Rossen et al., was the production of non-positive definite matrices. This is a problem encountered by other EI ability researchers (e.g. Palmer et al., 2005) and results in inadmissible models. It was argued that limitations in the number of subtests used contribute substantially to these non-positive definite matrices. Despite relaxing certain model parameters (increasing iterations and specifying error variance as zero), establishing covariance links and so on, these models still failed to converge. One could adjust the estimation parameters to generalised least squares (GLS) instead of maximum likelihood estimation (MLE), however other researchers have applied the more stringent MLE, in order to apply the same evaluative criterion as is applied in other factor analyses of mental ability tests.

Indeed when one considers the stability of the factor structure exhibited by other measures of mental ability, as others (e.g. Roberts et al., 2001) have done, and compares this with the stability of factor structure displayed by the MEIS, there is an appreciable difference. However factor analytical research of intelligence has been conducted for over a hundred years and intelligence tests have benefited in their development as a result of analysis within a similar time frame. Given the request for either developing new subtests for existing measures of EI ability, or adopting the parceling approach favoured by Mayer et al. (2005), it may be some time before a conclusive model emerges.
Discriminant and Convergent Validity

In terms of evidence supporting EI ability theory and measurement, the studies reported here have replicated the discriminant and convergent validity findings of others with respect to EI ability measures. As previously suggested (Daus & Ashkanasy, 2005; Van Rooy et al, 2005a), the MEIS demonstrated good discriminant validity as evidenced by a lack of significant correlations between total EI scores and the big five factors of personality (with the exception of Neuroticism). Also consistent with previous research (e.g. Mayer et al., 1999; Roberts et al., 2001), MEIS raw scores were significantly correlated with another measure of intelligence, in this case verbal reasoning, but not to the extent where these measures could be said to measure the same intelligence. Therefore the MEIS demonstrates good convergent validity when compared with another measure of intelligence.

Although the research design adopted here considered personality and cognitive intelligence separately with respect to emotional intelligence, the fact that EI correlated at above $r = .40$ level with verbal intelligence and minimally with the Big Five factors of personality, suggest that EI is more closely related to cognitive ability than it is to personality. This is consistent with the theoretical framework underpinning EI, where a deliberate effort was made by the developers of EI theory to define and measure a construct which mapped onto intelligence factor space, while remaining relatively distinct from personality. The results from this study indicate that they have succeeded in this endeavour.
Convergence of scoring methods

With regard to the question raised by Roberts et al. (2001) of whether the MEIS can be scored reliably according to expert and consensus scoring methods, correlations across Branches from this research were consistent with those reported by Mayer et al. (1999), indicating that expert and consensus responses are consistently and moderately correlated across all Branches. Therefore MEIS results based on these two scoring methods are likely to be quite similar. This result is significant beyond just replicating Mayer et al’s findings, it indicates that the external validity of expert scoring for EI measures may be extended to an Australian work context. The fact that the expert-based scoring method for an EI ability measure correlates with the responses of an Australian organisational sample, in a similar way as it does with US consensus scores is evidence for this.

The issue of scoring ability measures is also worth considering within the context of organisational utility. This is because EI ability measures such as the MEIS are of little value for use in organisations, if the collective responses of individuals working in organisations differ significantly from what the authors of the MEIS consider to be appropriate responses. The results reported here indicate that participants respond to MEIS items in a manner which is consistent with what the authors of this measure consider to be appropriate responses.

Examining issues identified previously with the way the MEIS is scored, has generated a new scoring group for an EI ability measure, namely an Australian organisational consensus group. The discovery of significant correlations between Australian organisational consensus scores and expert-based scores for the MEIS,
A Psychometric evaluation of the emotional intelligence ability construct extends previous findings regarding the cross cultural applicability of the consensus-based scoring criterion to other western societies (e.g. Palmer et al., 2005), to include working groups from these societies.

**Scoring and Gender**

As Van Rooy et al. (2005b) observe, the fact that EI ability is moderately correlated with intelligence makes it likely that group differences may arise, as they often do with other measures of intelligence. Study 2 identified group differences in EI scores based on the gender of the groups studied. These differences varied as a function of the scoring method adopted, with women scoring significantly lower on the MEIS when an expert-based scoring criterion was used than they did when a consensus-based scoring criterion was adopted.

These findings suggest that expert scoring for the MEIS does not adequately represent the variance of scores generated by females who complete this measure. However in light of the lack of a gender by scoring method interaction in the research of Palmer et al. (2005), results in Study 2 can be taken as evidence that the MSCEIT demonstrates an improvement over the MEIS. This is likely due to the fact that both of the experts who formed the 'expert group' for scoring the MEIS were male. It can be argued therefore that the introduction of more experts, including an equal number of female experts, into the expert scoring group for the MSCEIT has not only resulted in better convergence between expert- and consensus-based scores (Mayer et al., 2001), but that this increased convergence represents, in part, the variance in expert female responses to items on the MSCEIT which is now better represented.
Conclusion

Many of the previous psychometric findings in relation to measures of EI ability were replicated in these three studies. Based on the responses of Australian individuals from work and business settings, the MEIS demonstrated encouraging convergent and discriminant validity, which was evident from an examination of its relationship with another test of mental ability and its relationship with a personality measure. Contrary to some research (Roberts et al., 2001), the two scoring methods employed in scoring the MEIS, expert- and consensus-based, were found to converge significantly and consistently at around the $r = .70$ level. These results extended the findings of past research in terms of generalising the expert-based scoring methods to a new consensus-based scoring group, the Australian organisational group. This is important as expert-scoring is likely to emerge in the long-term as the MSCEIT authors’ preferred scoring system (Mayer et al., 2003).

To paraphrase Daus and Ashkanasy (2005) the MEIS emerged from this corner of the psychometric arena having continued to land some pretty solid punches.

On the psychometric downside, reliabilities were lower than previously reported and the expert scoring method associated with the MEIS was not equitable with respect to gender. Previous research suggests that women perform significantly better than men on EI ability measures when consensus-based scoring is adopted (Brackett et al., 2006; Ciarrochi et al., 2000; Roberts et al., 2001). Additionally, Palmer et al. (2005) found that women scored significantly better than men when either an expert or consensus scoring criterion was applied to produce scores on the MSCEIT. This past research, taken in conjunction with the gender interaction described in this research, means that legitimately superior performance by female
respondents may be missed if an expert-based scoring criterion is used to provide scores on the MEIS. This was a suspicion of the MEIS held by some researchers (e.g. Palmer et al., 2005) but had not been confirmed until now.

Low reliabilities and differential effects for gender suggest that some of the serious concerns raised by previous researchers when evaluating the psychometric properties of the MEIS in light of results from working populations (e.g. Roberts et al., 2001) are also evident when Australian workers are administered the MEIS. Other serious issues, such as a lack of convergence of scoring methods, were not observed with respect to an Australian working population.

Confirmatory factor analysis conducted in this research complemented the work of Mayer et al. (1999) and Ciarrochi et al (2000) in testing the viability of one- and two-factor models identified during exploratory factor analysis of the MEIS. These findings were also consistent with one- and two-factor models tested by other researchers who have used the MSCEIT (Palmer et al, 2005; Rossen et al., 2008), with the exception that support for a general factor which loads all factors significantly was not as strong. However, this research failed to replicate more complex factor models due to their production of non-positive definite matrices. This finding highlights a common issue in EI ability factor analysis research, namely a lack of a sufficient number of EI ability subtests to adequately represent the Mayer-Salovey-Caruso model.
Research Critique

As stated in the opening rationale for these studies, this research included convenience sampling of working Australians and because the MEIS represented the only peer-reviewed EI ability measure commercially available at the time that research design and data collection first began, MEIS data were the only data available. Although the MSCEIT was commercially available at the time data collection began for the only experimental sample, it was considered more consistent to continue with the MEIS. Should these studies be conducted today the MSCEIT would be included as the measure of ability EI under psychometric investigation.

Additionally, this research studied the factor structure of the MEIS by examining expert-based scores when previous research suggests that consensus-based scores are likely to produce more robust factor structures (Mayer et al., 2001). As stated previously, this research attempted to generate a new consensus group by studying Australian workers, and it was not possible to generate consensus-based scores for this group without associated positive skew. Future research would ideally study the factor structure of both expert- and consensus-based EI ability scores within an organisational context.

Guilford (1954) argues that N should be at least 200 when conducting factor analytic research, while Cattell (1978) recommends a minimum of 250. More recently Comrey and Lee (1992) have provided the following guidance in determining the adequacy of sample size for factor analysis: 100 = poor, 200 = fair, 300 = good, 500 = very good, 1,000 or more = excellent. By these standards the
sample size included in this research is between fair and good and including more respondents would have increased the power of these analyses. However, the factor analysis in this research included a convenience sample and data from the 231 respondents were all that was available within the timeframe for this research.

**Future Research Directions**

The studies reported here may prompt tomorrow’s researchers to consider some avenues of investigation worthy of further pursuit. For example, a factor analytical examination of the MSCEIT using an organisational group would complement the research conducted here. Mayer et al. (1999) included working individuals in their original factor analysis of the MEIS but half of this sample were college students. The only other factor analytical research involving organisational groups of which this researcher is aware is the Roberts et al. (2001) study. However this study is restrictive in the range of organisational groups it samples, including only US Air Force trainees. In testing MSCEIT factor models through confirmatory factor analysis in the future, parceling of subtests as suggested by Mayer et al. (2005) may be required given the consistent observation of non-positive definite matrices observed in this and other research.

The MSCEIT has successfully addressed the issues of reliability (Mayer et al., 2003) and gender equity in scoring (Palmer et al., 2005) when academic and general populations are studied. In so doing it has demonstrated an improvement over the MEIS with respect to its psychometric properties. However, because these issues were first raised in relation to the MEIS when a working sample was studied (i.e. Roberts et al., 2001) and replicated in this research with other working groups,
future research involving the MSCEIT should address these same issues by studying organisational groups to ensure that the MSCEIT continues to demonstrate the same psychometric improvement over the MEIS when working populations are studied.

As Van Rooy et al. (2005a) note, to the extent that EI ability measures such as the MEIS represent an aspect of general mental ability, the use of such measures is likely to result in adverse impact when used in high stakes testing such as job selection. This argument is based on the observation that large differences in mental ability test scores have been observed between members of minority groups and non-minority groups (Schmitt & Chan, 1998). This research did not include minority groups in its design although it is possible and indeed likely that such issues may arise for Australian minority groups. For example, Indigenous Australians represent 2.4% of the Australian population (Department of Education, Employment and Workplace Relations, 2008) and thus constitute a minority group. Within Indigenous Australian cultures there are complex rules relating to eye contact (Department of Education, Employment and Workplace Relations, 2008) which may impact on an Indigenous person’s ability to identify emotions in facial expressions. Furthermore, Indigenous Australians tend to respond better to indirect questions than direct or blunt questions and can exhibit reluctance in answering questions to which the answer is already known (Department of Education, Employment and Workplace Relations, 2008). There may be differences therefore between the responses of Indigenous and non-Indigenous Australians to an emotional understanding item on an EI ability measure, for example, as such items are phrased quite directly, and because these items involve definitions of emotional terms it could be argued that these definitions are already known. EI ability
assessments involving Indigenous Australian populations may therefore not be appropriate in high stakes testing, such as job selection, until data become available demonstrating that EI ability measures are culturally fair with respect to such populations.

Another issue which arises if EI ability is considered an aspect of general mental ability relates to job complexity. The validity of mental ability tests in predicting successful work performance is moderated by job complexity, such that cognitive ability is most valid for jobs high in complexity and least valid for jobs low in complexity (Schmitt & Chan, 1998). Schmitt and Chan attribute this variability in validity to differences in the extent to which the job makes cognitive demands of the incumbents. When one extends this argument to the domain of emotional intelligence, it can be argued that the validity of EI ability assessments in predicting successful work performance may vary as a function of the emotional complexity of that job. Specifically, more emotionally complex or demanding jobs, counseling for example, may require more emotional intelligence than less emotionally complex jobs, such as manufacturing for example. EI may therefore be a more valid predictor of job success in counseling settings than in a manufacturing environment. Caruso and Wolfe (2001) acknowledge the importance of job context to EI assessment, in stating that a job’s requirements needs to be explicitly described in behavioural terms or objectives prior to initiatives such as EI ability testing. Future research should explore the relationship between EI and the emotional complexity of specific roles, and indeed some promising work has begun in examining the relationship between EI and the amount of emotional labour required by a role (e.g. Joseph & Newman, 2010).
This research tackled some of the major psychometric issues identified in the EI ability literature such as construct validity and convergence of scoring methodologies, using participants from Australian organisations. Another important organisational validation study of ability EI will involve an examination of the relationship between ability measures of emotional intelligence, such as the MSCEIT, and criteria that predict important work outcomes.

Some promising research has already been conducted in this area. For example, Rice (1999) administered the MEIS to 164 people working in the insurance industry in 26 teams which were lead by 11 team leaders. The average MEIS scores of the teams were significantly correlated with team manager’s ratings of customer service effectiveness and team leaders’ effectiveness. Pusey (2000) found in a study of 42 UK employees, that total scores on the MSCEIT and scores from the Using Emotions Branch were significantly correlated with job performance ratings. However such studies are few and far between and this is an area where future research is definitely needed if the value of ability measures of EI in organisational settings is to be evaluated more comprehensively.
Appendix 1: Participant Recruitment Letter

Dear (Name),

Thank you for speaking with me on the phone earlier regarding my intended research in emotional intelligence. Basically, I am interested in the relationship between emotional intelligence and verbal intelligence.

Specifically, emotional intelligence can be considered to consist of four separate components or branches:

- **Perceiving and Identifying Emotions** - the ability to recognise how you and those around you are feeling.

- **Assimilating and Using Emotions** - the ability to generate an emotion, and to then reason effectively with this emotion.

- **Understanding Emotion** - the ability to understand the components of complex emotions and a comprehension of emotional “chains”, how emotions change with different situations. Additionally, the ability to engage in different perspectives or what is commonly called empathy.

- **Managing Emotions** - the ability which allows you to successfully manage emotions in yourself and in others, to select the most appropriate emotional strategies in response to situations where people’s emotions are important.

Emotional Intelligence is believed to be significantly important in a variety of occupational contexts, particularly those involving interpersonal considerations. It is a theory currently receiving considerable attention regarding its potential application within human resource and general organisational settings, and is already generating very positive reviews.

With this in mind I propose to administer a verbal ability measures (a published and widely used verbal reasoning test), and a published emotional intelligence ability test. I anticipate that this should take participants no more than an hour and a half, but the materials can be administered in groups of up to 20-30 to save time.

As I mentioned on the phone, participation is both voluntary and confidential. I can supply individual reports on request but no individual results will be discussed with anyone other than the participant who has made the request. I can provide a report on the group as a whole as well as some strategies on how some of the EI abilities may generally be enhanced.

I look forward to further discussions with you on this matter.

Yours Sincerely,
David Stritch
Appendix 2: Participant Information and Letter of Consent

School of Psychology
Division of Social Sciences

Project Title: A psychometric evaluation of the emotional intelligence ability construct among working adult Australians

I am a student at Murdoch University investigating emotional intelligence. Emotional intelligence was a concept initially devised by two psychologists, Dr. John D. Mayer and Dr. Peter Salovey. They defined it as the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth.

Specifically, emotional intelligence can be considered to consist of four separate components or branches:

- **Perceiving and Identifying Emotions** - the ability to recognise how you and those around you are feeling.

- **Assimilating and Using Emotions** - the ability to generate an emotion, and to then reason effectively with this emotion.

- **Understanding Emotion** - the ability to understand the components of complex emotions and a comprehension of emotional “chains”, how emotions change with different situations. Additionally, the ability to engage in different perspectives or what is commonly called empathy.

- **Managing Emotions** - the ability which allows you to successfully manage emotions in your self and in others, to select the most appropriate emotional strategies in response to situations where people’s emotions are important.

The purpose of this study is to find out more about the relationship between emotional intelligence and verbal intelligence, specifically verbal reasoning ability.
A Psychometric evaluation of the emotional intelligence ability construct

You can help in this study by consenting to complete a published emotional intelligence scale and a published verbal intelligence measure. The time to complete these assessments will vary, however, it is anticipated that no more than an hour and a half will be necessary. You will also be asked questions about your age and level of education, and you should not respond to these questions if you feel they are in any way personally invasive. Participants may also withdraw their consent at any time.

All information given during the study is confidential and no names or other information which might identify you will be used in any publication arising from the research. If you do wish to get individual feedback on your participation, please follow the instructions included in the document “Participant Feedback Instructions”.

If you are willing to participate in this study, please complete the details below. If you have any questions about this project please feel free to contact either myself, David Stritch, on 0422XXXX or my supervisor, Melanie Freeman on 9360XXXX.

My supervisor and I are happy to discuss with you any concerns you may have on how this study has been conducted, or alternatively you can contact Murdoch University's Human Research Ethics Committee on 9360 6677.

Informed Consent

I (the participant) have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to take part in this activity, however, I know that I may change my mind and stop at any time. I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law. I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant Name (Please Print):
Participant Signature:
Date:
Investigator's Name: David Stritch
Investigator Signature: [Signature]
Date:

Associate Professor Iain Walker
Dean of School of Psychology
Appendix 3: Participant Feedback Instructions

Please fill out the personal information section below. You will notice that the Participant Number has already been completed. For confidentiality reasons, this number is the only way that you (the participant) can be identified, and is also known only by you. If you would like written feedback on your results, could you also select a 6 - 8 character password and write this down in the box provided. Please make a record of both your participant number and password as they are the only means through which individual feedback can be provided.

To access your feedback, please contact (Business School/Entrepreneur Centre/Professional Body) and notify them of your interest in receiving feedback from today’s assessment. They will ask you for your participant number and password. They will then contact me to inform me that participant no. X with password Y wishes to receive feedback on their results. I will send a written report back in a sealed envelope with only your participant number and password on the cover for you to collect.

Please allow one month from the day of your participation before seeking feedback as this time is needed to tabulate results. You will receive your report within two weeks of making your request.
A Psychometric evaluation of the emotional intelligence ability construct

References


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