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Emotional Intelligence: A Psychometric Analysis

Lennart Sjöberg
Economic Psychology Section, Stockholm School of Economics, Sweden

The paper describes the construction and the construct validation of an extensive test battery for use in the selection process in business and business education. It is based on notions of social competence and emotional intelligence (EI) in broad senses of the terms. Participants were 226 persons who had applied for admittance to the undergraduate program of the Stockholm School of Economics. Many indices were constructed on the basis of their test responses. In a second-order factor analysis, four factors were identified: mental stability, emotional intelligence proper, dominance (including creativity and mental energy), and compulsiveness. These factors were related to emotional skills and to standard personality scales (Big Five, MPI, and Myers-Briggs scales), as well as to scales measuring risk-taking attitudes and variables measuring response styles. It was found that the secondary factors were less subjected to self-presentation bias than the Big Five scales, and that they were about equal to the MPI scales in this respect. These three sets of scales were rather strongly related, while the Myers-Briggs scales were only weakly related. We identified dimensions of emotional skills in judgments of mood, social problem episodes, music and art samples, and facial expressions. Some of these skill measures were related to the secondary factors as expected, thus further validating them. EI was found to contribute variance to the explanation of emotional knowledge not contained in standard scales of personality. Also, risk attitudes were systematically related to the secondary factors. The four secondary factors were unrelated to intellectual ability, and they were unrelated to temporary mood when habitual mood was controlled for.

Keywords: Emotional intelligence, personality, selection.

Intelligence has long been a core concept of psychological approaches to selection and recruitment (Schmidt & Hunter, 1998). It has been very well established that intellectual abilities—in the traditional sense of the word—are the best predictors in entry level selection in the job market, and that they are at least as good as school marks in the selection of applicants to higher education. They may be of great value in the latter context as well because school marks often do not exist in a valid or comparable format.

It is interesting to note that the marking system in Swedish secondary education has been subjected to many changes during the last few decades, the very last one being most profound and casting serious doubts on the usability of these marks for selection to higher education. At the same time, since the 1980's we have in Sweden a special (voluntary) entrance exam of high quality, which measures intellectual abilities in the traditional sense of the word (Wedman, 1993).

However, intelligence tests are sometimes criticized and in the eyes of many practitioners tend to have little credibility today. There is indeed a very long tradition of such criticism (McClelland, 1973), some of it exaggerated and ideological or uninformed, some of it justified (Sternberg, 1997). I will not go into that discussion in the present context. What I am dealing with here is where a selection on the basis of intellectual ability has already been made, be it on the basis of IQ-type tests or school grades. This is typically the case with the students of an institution with very high rates of applications and few openings for students, a primary example being the Stockholm School of Economics (SSE), where typically

Lennart Sjöberg received his PhD in Psychology at the University of Stockholm in 1965 with a psychometric thesis. He was Professor of Psychology at the University of Göteborg from 1970 to 1988 and since 1988 Professor of Psychology at the Stockholm School of Economics. His current research interests include risk management and risk perception, psychometrics as well as forensic psychology.

Correspondence concerning this article should be addressed to Prof. Lennart Sjöberg, Economic Psychology Section, Stockholm School of Economics, P.O. Box 6501, SE-11383 Stockholm, Sweden (tel. +46 8 736-9570, fax +46 8 307225, E-mail pls@hhs.se).

some 4000 applicants compete every year for the 275 openings available. Those who are admitted are selected mainly on the basis of intellectual ability, be it directly through the official University Entrance Exam or indirectly on the basis of secondary school grades. But what is predictive of job success in such a population? IQ seems not to be likely to be very successful as a predictor, because the group is already highly selected on that dimension. Success in higher education does have a predictive value, but it is quite weak (Hunter & Hunter, 1984), whereas job knowledge tests fare considerably better (Dye, Reck, & Murphy, 1993).

Various forms of personality tests are often mentioned as a possible way of improving selection decisions (Hogan, Hogan, & Roberts, 1996; Sjöberg, 2000). One reason for the interest in noncognitive factors may simply be that it has proven to be very difficult to improve, in the cognitive domain, on traditional *g* measures of general intelligence, in spite of major attempts to do so. Schmidt (Schmidt, 1994) put the matter as follows:

> "After over 50 years of research, including some very major research efforts during the 1980s, it is now evident that refinements in the measurement of abilities and aptitudes are unlikely to contribute nontrivial increments to validity beyond that which is produced by good measures of general mental ability. The areas of personality, biographical data, physical abilities, and perhaps interests are considerably more promising in that respect." (p. 348–349)

Interest in personality is strong and pervasive, and the field is very rich indeed with hundreds of concepts currently under study (Mayer, 1995). Personality is related to the social skills needed for teamwork, another area where new approaches for selection are emerging (Salas, Bowers, & CannonBowers, 1995; Stevens & Campion, 1994), including the considerations having to do with team heterogeneity (Klimoski & Jones, 1995). Selection can sometimes be improved by interest measures (Donnay & Borgen, 1996; Hansen, 1994) and possibly by measures of temperament (Kamp & Hough, 1988). Interest and ability were jointly analyzed by Ackerman and Heggestad (Ackerman & Heggestad, 1997).

Perhaps the current emphasis on the "Big Five" personality factors opens the door for some new developments with regard to personality, job performance (Goldberg, 1994), and social skills (Shafer, 1999). Conscientiousness, related to integrity (Ones, Viswesvaran, & Schmidt, 1993), is one of the Big Five factors said to be predictive of job performance (Barrick & Mount, 1991). Together with emotional stability it has been found the have some predictive value also in a major European meta-analysis (Salgado, 1997). Integrity tests, however, may be more efficient. Schmidt strongly argued for the use of integrity and other personality measures in some selection situations and estimated that they could provide a substantial increase in validity (Schmidt, 1994). The field of integrity testing was recently reviewed (Sackett & Wanek, 1996) and related to the Big Five (Marcus, Funke, & Schuler, 1997).

There are several examples where specific personality measures did improve on the global Big Five set of dimensions (Borman, Hanson, & Hedge, 1997). Clearly, specific dimensions deserve attention. Goleman has argued, in two very influential books, that "emotional intelligence" (EI) is the factor that is most responsible for success, e. g., in business (Goleman, 1995; Goleman, 1998). Many others, see e. g., Cooper (1997; Cooper & Sawaf, 1997) have since followed in his footsteps.

The term emotional intelligence is perhaps misleading since Goleman refers to social as well as emotional skills, and the two are not identical although they are probably related. Here I use the term or its acronym EI, however, since it has come to be commonly used.

Goleman's strong claims have so far had little empirical backing (Mayer & Cobb, 2000; Mayer, Salovey, & Caruso, in press). A recent attempt by Fox and Spector provides an exception. They studied EI and performance and reported some promising results (Fox & Spector, 2000): EI was found to provide some additional predictive power beyond traditional measures of intelligence. Goleman's claims have been instrumental in starting up research that may yield some interesting results (Abraham, 1999). Even if emotional intelligence and related concepts do not predict job success as strongly as traditional intelligence, it may still be useful. And, as pointed out above, intelligence selection has already been done in many practical selection situations, including the one dealt with in the present paper.

Risk-taking is alleged to be a crucial negative factor in some tasks (Vollrath, Knoch, & Cassano, 1999), and has been related to cognitive styles (Streufert, 1986). Risky behavior is typically assessed in an ambivalent manner, depending on the outcome. Risk-taking that has paid off is highly valued (Finney, 1978). Risk-taking and risk attitudes have been discussed in a personality context, e. g., by Olson and Struts (Olson & Suls, 2000), who related it to the Big Five personality dimensions and distinguished types of risk taking that are positively or negatively socially valued. In the present study, interest is

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focused on hazardous behavior and what may be termed pathologies of risk-taking.

Five hazardous thought patterns of pilots in commercial aviation have been identified: anti-authority, impulsivity, invulnerability, macho attitude, and resignation (Berlin, Gruber, Holmes, Jensen, Lau, Mills et al., 1982). These types of risk propensity may have general applicability. EI is a concept denoting successful adaptation and should be negatively related to risk-taking in the sense just outlined. Berlin et al. developed a questionnaire to measure these thought patterns, later also tested by Lester and Bombaci (Lester & Bombaci, 1984). A Swedish scale, using an ipsative response format, was developed by the author and was used in the present study.

Provided that EI is truly important for job success, it becomes imperative to measure it for selection and recruitment purposes. There have been a few attempts at such measurement, now to be briefly discussed.

Operationalizing EI and Social Competence

Modern work on emotional intelligence has a 10-year history, but of course there were earlier attempts to measure both emotional and especially social "intelligence" (Brown & Anthony, 1990; Ford & Tisak, 1983). New impetus to the field was provided by Salovey and Mayer in 1990 (Salovey & Mayer, 1990). Since then, there has been an upsurge of interest in these matters.

Mayer, Salovey and Caruso (Mayer et al., in press) reviewed the concept of emotional intelligence and its measurement. They defined emotional intelligence as "the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others."

They distinguished between ability and mixed models of emotional intelligence. Their own so-called MEIS scale (Mayer, Caruso, & Salovey, 1999) includes performance measures of the abilities to perceive, assimilate, understand, and manage emotions. These can be scored according to expert or consensual keys, sometimes also with target keys (Mayer & Geher, 1996)[1]. The authors reported that all three scoring approaches tended to converge, supporting the most practical consensual scoring method, and that the four facets also converged. The MEIS scores have been found to correlate moderately with empathy (Mayer et al., 1999). These results were replicated and extended in a recent Australian study (Ciarrochi, Chan, & Caputi, 2000), although with some mixed success in the sense that some scales had low reliability and the validity coefficients were moderate at best.

The ability approach is the most original one, while the mixed models are various scales of the traditional self-report type, e. g., the one derived by Bar-On (Bar-On, 1997), or Schutte et al. (Schutte, Malouff, Hall, Haggerty, Cooper, Golden et al., 1998). It has not yet been firmly established whether such scales measure anything beyond the traditional standard personality scales such as the Big Five, and whether that "something" is predictive of job or study success beyond traditional academic intelligence. The scale by Schutte et al. has also been criticized on psychometric grounds (Petrides & Furnham, 2000). The fact that traditional intelligence is by no means a perfect predictor does not imply that emotional intelligence—however measured—will fill the gap (Mayer et al., in press): Davies, Stankov and Roberts could not find that self-report measures of emotional intelligence had divergent validity (i. e., contributed anything beyond) with standard personality measures; they also had trouble establishing reliable consensually scored performance measures (Davies, Stankov, & Roberts, 1998). It should be added, however, that the publishers of the Bar-On test do claim that EI is a better predictor of job success than IQ, and they refer to a few as yet unpublished studies said to support that claim. A recent publication on the Bar-On test reports a comparison between police officers, child-care workers, and educators in mental health care on the test, finding police officers to have the highest EI in some respect (Bar-On, Brown, Kirkcaldy, & Thomé, 2000). It is not clear that this was to be expected.

In another study of the Bar-On test, some positive results were found with regard to its psychometric properties and relationship to alexithymia (Dawda & Hart, 2000). Alexithymia (Taylor, 2000) translates roughly to four facets: difficulty distinguishing and identifying feelings and bodily sensations, difficulty describing feelings, reduced daydreaming, and externally oriented thinking (Bagby, Parker, & Taylor, 1994a). Bagby, Parker, and Taylor were successful in identifying most of these constructs and in developing a short questionnaire for their measurement, which they also validated (Bagby et al., 1994a; Bagby, Parker, & Taylor, 1994b). Alexithymia

[1] An expert key is based on experts' judgments of, e. g., what emotion is expressed in a piece of music. A consensual key is based on the modal response of a group of subjects and a target key, sometimes applicable, is based on the emotion reported by a target person whose expressed emotion is to be judged by the subjects.

is implicated as a factor in low need for cognition and various problems of mental health (see Bagby, Buis & Nicholson, 1995). The work by Bagby et al. is a clear improvement over earlier approaches to the measurement of alexithymia, though they do not discuss its possible applications outside of clinical psychology.

A short self-report measure of emotional intelligence was found to be related to career commitment (Carson & Carson, 1998). Schutte et al. (1998) developed a 33-item measure of EI, obtaining promising results when they related it to other personality variables and to academic success. But their analysis did not establish a unique predictive value of EI.

From the research so far published on EI it is likely that it can be measured, either as a mental ability or in a self-report format. Nevertheless, little is known about the *relationships* between these different kinds of EI. Little is also known about the predictive value of the construct. Mayer et al. refer to a moderate correlation between empathy as measured by a self-report scale and EI in the sense of mental ability. Schutte et al. do not relate their measure to mental ability EI at all, but only to other self-report measures and academic success. In the present paper, I attempt a broader design in which mental abilities and self-report measures are obtained. Mental abilities measures are used as criteria and related to self-report measures. The latter are broadly sampled from the literature, and some new measures of our own have been added. In the criterion set of variables, I introduce a new measure called emotional knowledge. These variables are all described below.

Method

In the present section, I describe the test material, situation, and procedure as well as providing data on the participants. I also give some basic methodological results in the present section since they provide a basis for the substantial analyses to be reported in the results section.

Participants and Test Situation

The Board of the SSE decided, in the Spring of 1999, to create 30 extra openings for students starting in the Fall of that year, and to base selection to those slots on non-intellectual dimensions such as EI.

The author was commissioned to develop tests to be used for that purpose. From applicants not admitted in the regular procedure, the School invited 350 applicants most close to the cut-off in terms of the qualifications they had documented in their applications. Hence, the invitees were a quite select group, just slightly below those who had been admitted.

Two hundred and twenty-six of the 350 invited applicants took the tests. They were informed that the tests were not about intelligence or knowledge, but rather about personality as well as emotional and social skills important to vocational success. They had also been informed that the tests were to be taken in a group, that the SSE would only be informed about the final score and rank order, and that all individual information beyond that would remain confidential. They were encouraged to answer all questions truthfully and fully, and those who wished also got written notification of their results about 10 days after the test was completed. Any other questions about details of testing and scoring (many called before testing to find out about the test) were not answered.

On the whole, the participants appeared to be highly motivated for the test. Their mean age was 21.3 years (range 18–37), 87 (38.5%) were female and 139 male.

Test Development

The total test battery took about 6 hours of testing time, i. e., a full day of testing. The description thereof will be divided, for the purposes of this paper, into two sections: tests and criteria.

The tests described here were designed and selected so as to measure EI and some related dimensions. Not all can be counted as EI dimensions proper, but we did believe that they were of both practical and theoretical interest in the present context.

Some items were translated from the literature, among them the EI scale proposed by Schutte et al. (Schutte et al., 1998). Reliabilities were estimated[1] by means of Cronbach's α (Cronbach, 1951). The Schutte et al. scale (present $\alpha = 0.79$[2]) measures alexithymia, attention to feelings, clarity of feelings, mood repair, optimism, and impulse control. The empathy (Hogan, 1969) scale of Mehrabian and Epstein (Mehrabian & Epstein, 1970) was also used (present $\alpha = 0.76$), as well as the Jones and Crandall scale of self-actualization (Jones &

[2] Present α values are based on the testing reported in the present article, hence in many cases on translated scales. Small *SD*'s may account for some of the fairly low reliability coefficients noted here. It should also be noted that throughout I used a four-category response scale (see text), which in some cases is a divergence from the procedures of the original scales.

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Crandall, 1986) (present $\alpha = 0.66$). Furthermore, the alexithymia scale of Bagby, Parker and Taylor (1994a) was translated and employed here (present $\alpha = 0.83$), measuring ability to identify and describe feelings as well as a tendency to shun away from emotional dimensions in thought and social relations. Roger and Najarian (1989) described a set of items measuring four aspects of emotion control: rehearsal ($\alpha = 0.64$), emotional inhibition ($\alpha = 0.75$), benign control ($\alpha = 0.58$), and aggression control ($\alpha = 0.63$). (These scales refer to, respectively, ruminating about troubling events, suppressing feelings, lack of negative emotional reactivity, and lack of aggression.) All of these were included here although one of the scales had a low present α value. Broadbent's CFQ (cognitive failures questionnaire) scale (Broadbent, Cooper, Fitzgerald, & Parkes, 1982) was also used; this is a scale that purports to measure susceptibility to stress and mental health (present $\alpha = 0.88$). Nineteen of the items of the scale of Machiavellianism (Christie & Geis, 1970) and 11 additional items written for the present study were used (present α including the new items = 0.82). This scale measures a cynical and manipulative attitude and should be negatively related to EI.

Several scales were taken from current research in our unit: mental energy and work motivation (Sjöberg & Lind, 1994), 19 items with an $\alpha = 0.72$, creativity (25 items and $\alpha = 0.71$) and compulsive tendency (subclinical), 27 items and $\alpha = 0.76$. A scale called Enigma measures lack of understanding of oneself or other people, seven items and $\alpha = 0.73$. From an extensive item pool included in the questionnaire four more scales were constructed: dominance (11 items, $\alpha = 0.85$), emotional instability (16 items, $\alpha = 0.88$), introversion and social indifference (18 items, $\alpha = 0.85$), and inhibition and lack of spontaneousness (13 items, $\alpha = 0.83$). Using items of the type used in locus of control scales (Rotter, 1966), three indices were constructed: external control and fatalism (11 items, $\alpha = 0.61$), competence or internal control (10 items, $\alpha = 0.61$), and control by luck/unluck (8 items, $\alpha = 0.61$). Other ways of conceptualizing such items are available (Collins, 1974), but there is a consensus on a need for a multidimensional description (West & Finch, 1997).

In addition, several experimental items were included in the questionnaire, to be used in further test construction work. They are not described here but were of the same general nature as the items described. The total number of questionnaire items was 789. They were presented in random order. They were judged on a four-point response scale with the items "agree absolutely," "agree to some extent," "disagree to some extent," and "disagree absolutely."

Criteria

The first criterion dimension used was that of knowledge about other people's current and habitual mood, here called emotional knowledge. This is a measure not included in the MEIS scale devised by Mayer, Salovey and Caruso (in press), who studied other aspects of knowledge about emotions. To measure it, we used a mood scale consisting of 71 items, measuring six factors (Sjöberg, Svensson, & Persson, 1979). The six factors were happiness, tension, fatigue, confidence, extraversion, and social orientation. The participants were instructed to rate their own current mood at the start of the test session and then their habitual mood. After that, they were asked to rate the current and habitual mood of the other testees. The mean ratings of current and habitual mood were used as criteria. Factor scores were computed and the absolute differences between actual means of current and habitual mood, on the one hand, as well as beliefs about these dimensions, on the other hand, were computed for each participant and each factor. The α's (computed across the six factors) were 0.77 and 0.74 for current and habitual mood, respectively. They were correlated strongly, $r = 0.65$.

Table 1

Intercorrelations among mood scores. Above diagonal current mood, below diagonal habitual mood.

	Happiness	Extraversion	Social orientation	Activation	Relaxation	Confidence
Happiness	1.00	0.38**	0.54**	0.49**	0.37**	0.58**
Extraversion	0.40**	1.00	0.29**	0.10	0.17*	0.29**
Social orientation	0.41**	0.22**	1.00	0.46**	0.22**	0.34**
Activation	0.56**	0.25**	0.49**	1.00	0.26**	0.48**
Relaxation	0.33**	0.09	0.19**	0.16*	1.00	0.43**
Confidence	0.56**	0.42**	0.27**	0.43**	0.25**	1.00

In this and subsequent tables, * means $p < 0.05$, and ** means $p < 0.01$.

The intercorrelations among the scores in the six factors are given in Table 1 for current and habitual mood.

It should be mentioned that these findings are not trivial. We have established here the existence of an ability to estimate correctly how other people feel, and it will be used as a criterion to assess our tests of emotional intelligence.

I also computed the absolute deviations between current and habitual mood and the means (rather than the beliefs about other people's mood states) and found that these deviations were only weakly correlated with the scores measuring knowledge about other people's moods.

In a second phase of the test session, participants made ratings of music, art, social interaction episodes described in the questionnaire, and facial expressions. These tasks were all designed to measure their ability to identify emotions, this being the major aspect of EI according to Ciarrochi et al. (2000) and also the one most easy to measure. The "correct" answer in each case was the most common one given in the present group. This approach to scoring is commonly used in EI work (see, e. g., Davies, Stankov, & Roberts, 1998). In a few cases two response alternatives were equally often chosen, and most popular, and then they were both used as definitions of correctness.

The 20 music excerpts came from many different types of music, from classical to hard rock. The art samples were slides from two art museums in Stockholm (classical and modern). They were all judged on five category bipolar scales, measuring:

- positive experience vs negative experience
- interesting vs uninteresting
- happy vs. sad
- warm vs. cold
- relaxed vs. tense
- friendly vs. aggressive
- admiring vs. contemptuous
- reassuring vs. frightening
- easy to understand vs. hard to understand

Participants were instructed to rate the emotion expressed in the music or art samples, *not* how they themselves felt. Only the last seven of these scales were used in scoring emotional identification. (How they felt was reflected in the first two scales which were not scored.) Each music or art sample was available for judgment for about one minute.

Ten social episodes, each involving two key actors, were then described. The participants were asked to rate, on unipolar three-category scales, to what extent each of the two actors felt, at the conclusion of the episode:

- happy
- angry
- sad
- ashamed
- proud
- relieved
- disappointed
- surprised
- guilty

All of the nine scales were used in scoring. In the final part of the section on emotional identification, 12 pictures from the Lightfoot series of facial expressions (Engen, Levy, & Schlosberg, 1957) were displayed, and the participants rated them on eight scales:

- happiness
- anger
- sadness
- shame
- guilt
- contempt
- surprise
- fear

The α values were rather low for the first three parts: 0.55, 0.53, and 0.60 for music, art and episodes, respectively. The value for facial expressions was higher, α = 0.71. Intercorrelations are given in Table 2.

There was a clear tendency for a general dimension of ability to identify emotions, even if some of the correlations were rather weak. The scores on the emotional identification tasks did not correlate with the emotional knowledge (based on moods) scores.

Table 2
Correlations among the four emotion identification scores.

	Facial expressions	Episodes	Art	Music
Facial expressions	1.00			
Episodes	0.20**	1.00		
Art	0.12	0.22**	1.00	
Music	0.04	0.33**	0.38**	1.00

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Several standard personality dimensions were also measured, to be used as criteria. Eysenck's MPI scales (Eysenck & Eysenck, 1985) were used, but the psychoticism scale had a too low α value to be useful[3]. The α's for neuroticism, extraversion, and the lie scale were 0.82, 0.87, and 0.81, respectively. A Big Five questionnaire (Wiggins & Trapnell, 1997) was also used, with 20 balanced items in each factor[4]. The α values were 0.8 or better.

The Swedish version of the Myers-Briggs Type Indicator (Mårdberg, Niemenmaa, Hillström, & Carlstedt, 1994) was also used, but the typology was not employed, only its informational basis of four dimensions. Internal consistency α's could not be determined. The typology is not upheld in current psychometric work, while some validity of the four dimensions is supported (Boyle, 1995). The Swedish scale has not been validated but a psychometric analysis of the items is available (Mårdberg et al., 1994).

The Big Five include a factor called conscientiousness, which seems close to our concept of compulsiveness. However, a special analysis of the pertinent Big Five items and our items intended to measure compulsive tendency showed relatively little overlap. The Big Five factor is dominated by items measuring commitment to duty and hard work, while the compulsiveness factor measures mainly perfectionism. Conscientiousness is known to be, on the whole, the best predictor of job success among the Big Five (Barrick & Mount, 1991).

One more criterion was available: scales of risk attitudes. The risk attitude scale was given in an initial questionnaire dealing with risk issues and the participants were told (correctly, of course) that it was voluntary and would not count toward the admission recommendation. The risk attitude scale measures:

- Anti-authoritarian inclination
- Impulsivity
- Beliefs about invulnerability
- Macho attitudes
- Resignation
- Self-presentation bias response style (lie scale). This lie scale is of course different from the two other scales of social desirability response scale that we used.

The present α's were, in the order of the scales given above, 0.52, 0.63, 0.65, 0.61, 0.53, and 0.65. These values are somewhat low, but so were the standard deviations of the scores. In a nonselect group of adults, α's around 0.75 were recently obtained. In the nonselect group, the standard deviations were about 30% larger than in the present group.

The risk-attitude scale used an ipsative format, i. e., participants were instructed to rank how well they agreed with the statements in lists of six statements each. Ten such lists were presented (in all 60 items), and each scale score was thus based on 10 items. (Factors 1 and 5 used nine items only.) They were also asked to agree or disagree with each item, and the final rank score of each item was negative if the participant disagreed, positive if he or she agreed to it.

Finally, scores were obtained from most subjects on a scholastic aptitude test administered by the government which they had taken earlier. This test is voluntary but taken by most students entering tertiary education. Very good scores qualify for admission to the most competitive programs. The test measures academic or analytic intelligence in the conventional manner with several subtests, but only the pooled score is available for the present study.

Response Styles

To measure response style and self-presentation bias, we employed the Crowne-Marlowe measure of social desirability (Crowne & Marlowe, 1960) (present α = 0.84) as well as the MPI lie scale (see above). These scales were included in order to check for impression management, which was expected to be present. They were strongly intercorrelated (r = 0.75). Further response style dimensions were derived from the questionnaire session: proportion of omitted items, and proportion of agreeing and extreme responses among nonomitted items.

Critics of the social desirability scales argue that these may well measure some real factor such as adjustment (McCrae & Costa, 1983; Robinson, 1973). However, the items do measure a not very sophisticated tendency in impression management; it is unlikely that those who endorse such items tell the truth because people simply are simply not that well adjusted. Or they may in fact see themselves in such a light and that would not seem to be a sign of good adjustment but the opposite.

[3] The group consisted of young people with a high level of scholastic achievement and possibly did not include the variation in psychoticism to be expected in a sample from the general population, or from clinical samples.

[4] Due to a technical mishap one item was missed and one was deleted for other reasons. The response scale used four categories, not five as in the standard version. A few items were slightly rephrased.

Procedure

The participants went through the various tasks in the following order:

- Risk questionnaire
- Mood ratings
- Identifying emotions in music, art, social episodes and facial expressions
- Myers-Briggs Type Indicator
- Short stories to be written about positive and negative emotional experiences. These were for use in further research and test construction and will not be analyzed here.
- Main personality questionnaire.

The total maximum number of judgments asked for by each participant was 2123. (They also wrote short stories, see above.) This may sound like a big job, but most participants found it easy to finish it in good time before the closing of the session. The final data set comprised about 10% less then the maximum possible (slightly less than 0.5 million responses), due to omitted items.

Results

Main Personality Questionnaire Structure

The 21 indices described above were subjected to factor analysis, which could be regarded as a second-order factor analysis. Direct oblimin rotation was used, and rotated factors were quite independent. Four broad factors were obtained (see Table 3), which explained 62.4% of the variance; there was no indication of a meaningful fifth factor. The pattern ("loading") matrix of Table 3 shows quite clearly that the factors were distinctly defined. They were interpreted as follows:

- Factor 1: Mental instability
- Factor 2: Emotional intelligence proper (EI)
- Factor 3: Dominance and energy, including creativity
- Factor 4: Compulsive tendencies

It is interesting to note that creativity was included in the factor of dominance/energy, which was independent of the other secondary factors. Creativity has often been discussed as an interfering component in social adjustment (Dixon, Hickey, & Dixon, 1992).

Table 3
Factor pattern of the four factor solution to the 21 indices. Loadings < 0.4 deleted.

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Lack of spontaneity	0.77			
Benign control	–0.73			
Cognitive error	0.63			
Instability	0.61			
Enigma	0.60			
Aggression control				
Introversion		–0.87		
Empathy		0.82		
Emotional inhibition		–0.74		
Machiavellianism, revised scale		–0.58		
Alexithymia		–0.56		
Self-actualization		0.44		
External attribution		–0.41		
Dominance			0.87	
Schutte et al. EQ			0.65	
Creativity			0.63	
Energy			0.58	
Competence attribution			0.45	
Compulsiveness				0.86
Rehearsal				0.49
Luck attribution				

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Table 4
Correlations between secondary factors and Big Five scales.

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Agreeableness	–0.12	0.47**	0.05	–0.13
Conscientiousness	–0.12	0.30**	0.22**	0.16*
Emotional stability	–0.62**	0.33**	0.53**	–0.40**
Extraversion	–0.50**	0.55**	0.54**	–0.30**
Intellect/autonomy	–0.49**	0.36**	0.74**	–0.24**

Table 5
Correlations between secondary factors and Myers-Briggs scales.

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Extraversion	–0.31**	0.38**	0.32**	–0.29**
Judging	0.11	0.15*	0.02	0.16*
Sensing	–0.02	–0.12	–0.24**	0.14*
Thinking	–0.19**	–0.05	0.28**	0.02

Table 6
Correlations between secondary factors and MPI scales.

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Extraversion	–0.37**	0.37**	0.55**	–0.24**
Neuroticism	0.64**	–0.50**	–0.40**	0.46**

Table 7
Correlations between secondary factors and risk scales.

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Impulsivity	–0.20**	–0.05	0.20**	–0.14*
Invulnerability	0.06	–0.14	0.14*	–0.14*
Macho attitude	–0.01	–0.12	0.33**	–0.04
Anti-authoritarian attitude	0.04	–0.25**	0.07	0.03
Resignation	0.24**	–0.27**	–0.10	0.04
Lie scale	0.08	0.02	0.14	0.15*

The defining indices were standardized and combined, and overall scores in the four factors were calculated for each participant. The distributions of these scores were reasonably normal-looking. The number of items used for each score was 77, 141, 98, and 41 for the factors in order 1–4. The factors were correlated with the three sets of personality variables included in our design, i. e., the Big Five, the MPI dimensions (except psychoticism, see Methods), the Myers-Briggs dimensions, and the risk scales. The results are given in Tables 4–7. It is noteworthy that all of the Big Five dimensions were related to EI proper—not only intellectual openness. Extraversion was most strongly related to EI, as expected (Ciarrochi et al., 2000), but almost as strongly also to other secondary factors.

Table 4 shows that EI correlated substantially with the Big Five dimensions, and that the other secondary factors also correlated with most of them. The MPI scales were also, in some cases, highly correlated with the secondary factors, see Table 5.

Table 8
Correlations between secondary factors and emotional knowledge (mood ratings).

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Emotional knowledge, habitual mood	–0.34**	0.31**	0.21**	–0.16*
Emotional knowledge, current mood	–0.33**	0.31**	0.14*	–0.25**

Table 9
Correlations between secondary factors and emotional identification skills.

	Mental instability	Emotional intelligence	Dominance	Compulsive tendencies
Music	–0.01	–0.05	–0.11	0.10
Facial expressions	–0.10	0.22**	0.05	–0.02
Art	–0.04	–0.13*	–0.21**	0.02
Episodes	–0.12	0.00	–0.04	–0.03

There was a tendency for the Myers-Briggs scales to be less clearly related to the secondary factors than was the case for the Big Five and the MPI scales.

These correlations show that the factors were strongly and systematically related to the Big Five factors and to Extraversion and Neuroticism, but only weakly to the Myers-Briggs scales. Whether this is good or bad is a matter of debate. The fairly strong relationships mean that much of the variance in the factors can be accounted for by the standard scales. On the other hand, this also means that the secondary factors measure well established personality dimensions. The question remains whether they are more valid than the standard scales in differentiating emotional skills (and other relevant skills, say, in business) and whether they are more or less subject to response styles. The latter is a particularly important issue in a competitive testing situation. I now turn to emotional skills and then treat the matter of response style analysis.

Emotional Skills

The secondary factors were related to the measures of emotional skills: emotion knowledge and emotion identification, see Tables 8 and 9.

The results were partly encouraging though not entirely so, since the relationships between the emotional identification skills and the factors were low or inconsistent with expectations, with one exception.

The other personality dimensions measured here were also related to the emotional skills variables. No consistent or otherwise strong relationships were found with emotional identification skills. As to emotional knowledge, these two variables correlated with Big Five and MPI variables at the same level as with the secondary factors, while emotional knowledge variables were virtually unrelated to the Myers-Briggs scales. The secondary factors were about 30% more effective in accounting for emotional knowledge than the Big Five scales, and slightly less effective than the MPI scales, which accounted for about 14% of the variance. The Myers-Briggs scales accounted for only 3% of the variance in emotion knowledge.

Mayer et al. emphasized empathy among all the possible EI dimensions and found significant correlations with their measures of emotional abilities. In the present data, empathy did not correlate with emotional skills measures. A detailed analysis showed that only the art judgment scale correlated with several of the indices (12 out of 21) at a significant level.

To determine whether the secondary factors contributed anything beyond the standard scales, the following procedure was used with the two measures of emotional knowledge as dependent variables. Predictors were entered in three blocks: the Big Five and MPI scales in block 1, the 4 Myers-Briggs dimensions in Block 2, and the secondary factor scales in Block 3. The proportions of variance accounted for in the three blocks were 0.131, 0.159, and 0.174 for current mood, and 0.130, 0.177, and 0.188 for habitual mood. Furthermore, only three and four predictors obtained significant beta coefficients: MPI neuroticism and extraversion (only habitual mood), Myers-Briggs "sensation minus intuition" scale and the secondary factor we have called EI proper. It is

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Table 10
Correlations between response styles and Big Five scales.

	Social desirability	Lie scale	Acquiescence	Omitted items	Extreme response style
Agreeableness	0.50**	–0.39**	–0.32**	–0.16*	0.43**
Conscientiousness	0.59**	–0.50**	–0.13	–0.04	0.39**
Emotional stability	0.52**	–0.26**	–0.25**	–0.02	0.63**
Extraversion	0.28**	–0.02	–0.12	0.04	0.61**
Intellect/autonomy	0.29**	0.00	–0.05	–0.07	0.67**

Table 11
Correlations between response styles and MPI scales.

	Social desirability	Lie scale	Acquiescence	Omitted items	Extreme response style
Extraversion	–0.18*	–0.06	0.01	–0.07	–0.49**
Neuroticism	0.55**	–0.29**	–0.42**	–0.03	0.58**

Table 12
Correlations between response styles and secondary factors.

	Social desirability	Lie scale	Acquiescence	Omitted items	Extreme response style
Mental instability	–0.27**	0.09	0.48**	–0.04	–0.49**
Emotional intelligence	0.29**	–0.17**	–0.47**	–0.10	0.57**
Dominance	0.37**	–0.10	0.21**	–0.05	0.67**
Compulsive tendencies	–0.07	–0.06	0.49**	–0.02	–0.21**

Table 13
Correlations between response styles and Myers-Briggs scales.

	Social desirability	Lie scale	Acquiescence	Omitted items	Extreme response style
Extraversion	0.09	0.06	–0.10	0.07	0.29**
Judging	0.19**	–0.25**	–0.05	0.04	–0.12
Sensing	0.29**	–0.16*	–0.01	0.01	0.15*
Thinking	0.35**	–0.35**	–0.09	0.02	0.14*

thus established in these data that EI did yield information not contained in standard scales.

The tendencies to omit items, to agree or to give an extreme response were all quite stable over the whole questionnaire. Correlating the scores for the first and final quarters, the correlations were 0.73, 0.60, and 0.90 for item omission, agreeing and extremeness of response, respectively. Note that these are *general* response styles, which are accumulated across 789 items and a wide variety of item contents, with items given in random order with regard to the scales.

The Big Five scales consisted of simple self-related statements, all beginning with the word "I." Half were reverse scored. In this sense, the Big Five scales were balanced. Their correlations with the response style dimensions are given in Table 10. It is interesting to note that these standard Big Five scales were by no means free of social desirability response bias[5], in several cases they

[5] They may not have been designed primarily to measure personality in highly competitive selections contexts, involving intellectually superior subjects.

were quite heavily loaded on that type of bias. Furthermore, agreeing response set was also correlated, albeit more weakly, with the scales (despite their balanced design), and extremeness of response quite strongly so. Item omission was not related to the scores.

These results can be interpreted as follows: Participants were more inclined to agree with a Big Five item which was codirectional with the concept than they were to reject an item that involved rejecting the concept. The positive items were hence better at defining the concepts. The extremeness style results show that participants were as sure of their acceptance as their rejections, or as willing to accept surely as to reject surely.

As to the MPI scales, there was a problem with the Neuroticism scale which correlated rather strongly with social desirability and acquiescence, but not the extraversion scale (see Table 11).

The secondary factors found here were correlated with style variables (see Table 12). It is found that they were less susceptible to social desirability response style than the Big Five scales. The correlations varied, but the amount of variance contaminated with this response style was on the whole less than 10%. The tendency toward item omission played a marginal role in this case as well. The agreeing response style worked as for the Big Five scales, except for EI, where the correlation was negative. This means that participants most distinctly expressed EI when rejecting an item, saying "I am not like that." To be sure, the factors found here were not as balanced as the Big Five scales were, the number of reversed scoring items being 21, 24, 15, and 15% for the factors in order 1–4. It is notable that EI had the highest proportion of reversed scored items (24%), and that the varying patterns in Table 12 could hardly be explained by the lack of scale balance in this sense. It is also interesting to note that participants tended to be hesitant when agreeing to items measuring factors 1 and 4. These are negatively loaded factors of emotional instability and compulsiveness, and the participants may simply have been reluctant to admit having such traits, or being truly more uncertain (Baumgardner, 1990).

The Myers-Briggs scales were also related to response style variables, see Table 13. They were not independent of social desirability contamination (in three of the four dimensions) despite the ipsative format used. Indeed, the Myers-Briggs scales appeared to be susceptible to social desirability response bias to the same extent as the secondary factors.

What is the practical meaning of social desirability variation? To answer that question, the MPI Lie scale and the Crowne-Marlowe scales of social desirability were pooled to a common index and used to predict each of the four secondary factors. The residuals can be regarded as factor scores with the effect of response bias removed. The residuals correlated about 0.6 with the raw scores (both Pearson and Spearman rank correlations were computed, and they were quite similar). It was furthermore assumed that a 10% cut-off was of interest, that being the goal set by the School. The 90th percentile was therefore determined for raw factor scores and for the residuals with social desirability removed, and the two sets of factor scores were cross tabulated for each factor. It was found that, for all four factors, 90% of the participants were classified in the same way in the raw scores and the corrected residual scores. The uncorrected final score and the score corrected for social desirability and the lie scale correlated 0.90; the two response styles scales accounted for 19% of the variance of the final test score.

The scores on the college entrance test were correlated with the four secondary factors. The correlations were –0.15, –0.01, 0.03, and –0.17 for emotional stability, EI proper, dominance and compulsiveness, respectively. Only the latter correlation was statistically significant ($p < 0.05$), though still quite low.

Mood scores should have a low correlation to any personality measure since mood is a relatively temporary mental state. Just what is referred to as mood can be debated, however, and the core dimensions are those of hedonic tone, tension, and activation. The multiple correlations (squared, adjusted) between the secondary factors and these core mood measures were 0.125, 0.146,

Table 14
Partial correlations between secondary factors and current mood, habitual mood held constant.

	Happiness	Extraversion	Social orientation	Activation	Relaxation	Confidence
Mental stability	–0.05	0.07	0.04	0.03	0.07	–0.05
Emotional intelligence	0.05	–0.09	0.15*	0.19**	–0.02	0.05
Dominance	0.19**	–0.02	–0.05	0.10	–0.02	0.14
Compulsive tendencies	–0.09	–0.02	0.01	0.10	–0.01	0.02

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0.132, and 0.051 in the order emotional stability, EI proper, dominance and compulsiveness (mean 0.114). The 10–15% explained variance due to temporary mood is an upper value since some of the "temporary" mood tends to be relatively permanent. When habitual mood was statistically controlled, correlations dropped considerably, in most cases to a value close to 0 (see Table 14).

To further investigate the mood-EI relationship, mood scores were pooled to global measures of good mood, both habitual and temporary. It was expected that those high in EI would be more skillful in mood management and hence be in a better mood. Correlations between EI and mood were 0.44 and 0.37 (both p's < 0.01), but emotional stability correlated with pooled mood at the same level.

Gender and Age

Age correlated –0.19 ($p < 0.01$), 0.12, –0.03, and –0.30 ($p < 0.01$) with the four secondary factors in the order emotional stability, EI proper, dominance and compulsiveness. Hence, the older participants showed a somewhat higher level of mental adjustment, but no higher EI *per se*. The gender differences were significant, according to t-tests, in two cases: mental stability (factor 1) and dominance (factor 3). These differences were unfavorable for the female participants in both cases (assuming dominance to be a desired trait). The females did show the expected advantage in EI (Ciarrochi et al., 2000), but it was not significant (see Fig. 1 for these differences).

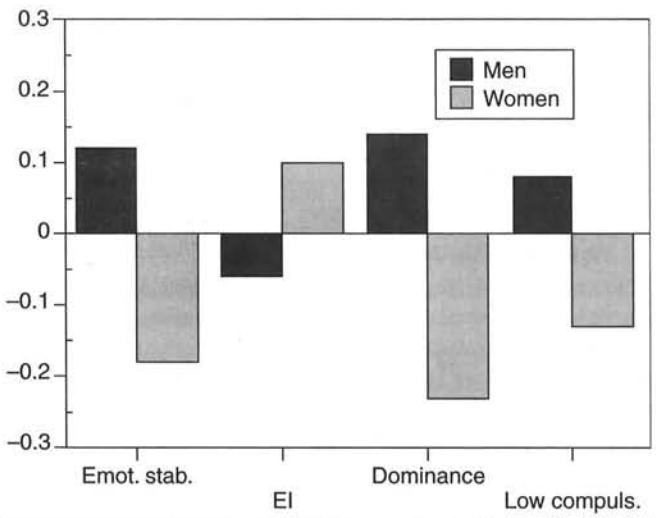

Figure 1
Mean gender differences in the secondary factors, standardized scores.

Discussion

The picture of EI provided by the present results is that it exists as a secondary factor, loaded in such dimensions as alexithymia, empathy, and self-actualization. It was negatively loaded in the cynical and manipulative attitude measured by Machiavellianism. Many other variables that could be construed as being vaguely related to EI, e. g., in such approaches as that derived by Bar-On (Bar–On, 1997), Cooper and Sawaf (Cooper & Sawaf, 1997), or Goleman (Goleman, 1995, 1998) formed other secondary factors, roughly unrelated in the factor analysis.

The EI measure proposed by Schutte et al. (Schutte et al., 1998) did not load primarily in the present EI dimension, but it did correlate significantly with it ($r = 0.34$, $p < 0.01$). The Schutte EI measure has, however, so far only been validated in a fairly limited sense (construct validation, a group difference between therapists and female prison inmates and a prediction of academic success after one year of study, $r = 0.32$). A closer scrutiny of the items used in the Schutte scale shows that most of them reflect self-efficacy in social and emotional dimensions, which is probably the reason why it correlated most strongly with scales measuring confidence, energy, and dominance, rather than EI. Petrides and Furnham (2000) furthermore found the Schutte scale not to be unifactorial. In the present data, the first component accounted for only 25% of the variance in an analysis at the item level.

EI can be construed in at least three major ways. Mayer, Salovey, and Caruso have pursued an original approach of seeing EI as a mental ability, and they have devised judgment tests for measuring it. However, they have not related those tests to other personality constructs except empathy, nor to other criteria. A number of other authors have conceived of EI as a catch-all term for a great number of social and personal skills, including identifying and managing emotions, but they have not related their constructs to the mental abilities approach. Little data are available relating these more vague conceptions of EI to external criteria. On the other hand, since they use such a big net, they are likely to catch some fish. A great number of studies have shown that personality variables measured with questionnaires do have some predictive power (see, e.g., Barrick & Mount, 1991). The third approach, supported by the present results, is to establish a convergence of some, but by no means all, of the personality dimensions that have been implicated in the broad and vague approach to the concept.

The validation results reported here are promising but not altogether successful, since emotional identification could not be measured with sufficient precision and was only moderately strongly related to EI. On the other hand, the criterion measure labeled emotional knowledge was clearly related to EI as measured here.

It had been expected that the two kinds of emotional skills should be related, but that did not happen. The Mayer et al. type of measures relate to particular stimuli, and the emotions they are perceived as reflecting. Our measures of emotional knowledge relate to *generalized* knowledge about how people react habitually or in a given situation. Both types of emotional skills would seem to be of potential importance to, among other things, job success. In the case of these measures of generalized emotional skills, some convergence with questionnaire secondary factors was noted.

The factors we identified were related to established personality dimensions with known validity as expected. It should also be emphasized that the very popular Myers-Briggs test (a bestseller among tests used in industrial psychology in Sweden) did not capture the dimensions measured by the present scales. Hence, they provide information beyond that of the Myers-Briggs test. Whatever is measured by the Myers-Briggs scales, it seems to be unrelated to emotional intelligence.

It can be debated how much information these factors provide beyond the Big Five and the MPI scales. It was found that EI did contribute to the explanation of emotional knowledge beyond what was achieved with standard personality variables. In addition, the present scales seemed less susceptible to response style bias, and for security reasons selection in highly competitive situations can obviously not be based on commercially available standard tests. Security is hard to establish when tests are very well known and can be easily obtained on the market, as is the case with the present standard scales.

Participants can be expected to give some responses that are not entirely honest in a situation such as the present one; faking has indeed been a current concern in research on personality measurement (Visveswaran & Ones, 1999). However, research on the issue has supported an optimistic conclusion: The effects on validity are small even in a selection situation. Extensive research on the question has shown that social desirability does not appear to influence scores to the extent of jeopardizing their validity (Barrick & Mount, 1996; Borman et al., 1997; Ones, Viswesvaran, & Reiss, 1996), and that faking more generally seems to be a somewhat marginal problem (Cunningham, Wong, & Barbee, 1994), as does coaching on similar and related tests (Palmer & Busciglio, 1996). Besides, the problem of course also appears in other forms of information gathering such as interviews (Seisedos, 1993). Response latencies, using a computerized testing design, can perhaps be used to detect faking and improve on questionnaire validity (Siem, 1996). Also, threats that faking can be detected may reduce it (Goffin & Woods, 1995). It is furthermore conceivable that some projective tests may be better than questionnaires when faking is prevalent (Ganellen, 1994). This kind of argument is, of course, basic to the use of a projective test such as DMT[6] (Sjöberg, Källmén, & Scharenberg, 1998), but projective tests are usually not considered for selection purposes because of their poor predictive validity. It is possible that a section involving active faking instructions may be a valuable addition to the test battery. It is also possible that statistical correction of raw scores should be considered; the present results indicate that such correction would yield important results in the sense that the top scorers would change to some extent.

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[6] This test, developed and validated in the Swedish Air Force for the selection of combat pilots, has long also been used commercially in managerial selection. As far as can be determined, there is no research supporting this application, and the original research supporting the use of the test in the Air Force is highly dubious and has never been replicated. Of course, projective tests are not usually believed to be useful in industrial and educational selection situations.

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