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Far Too Many Intelligences? On the Communalities and Differences Between Social, Practical, and Emotional Intelligences

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Summary

This chapter considers three constructs which have been proposed as candidate intelligences: emotional intelligence (EI), practical intelligence (PI), and social intelligence (SI). The definition and measurement of each of these is discussed, including consideration of problems with current measures. We point out that two different and not necessarily equivalent approaches to measuring new intelligences have been developed. Ability measures emulate the problem-solving approach of conventional intelligence tests, whilst trait measures rely on self-reports. The conventional definition of an intelligence is then discussed in detail and the extent to which each of the candidate intelligences matches or fails to match this definition is considered. We conclude that applying the label *intelligence* to these constructs may be premature, although there is evidence that ability EI and SI have intelligence-like attributes. More research is needed both on defining these new constructs and in establishing the communalities and differences between them.

6.1 INTRODUCTION

In this chapter we discuss three constructs that may be regarded as candidate intelligences: emotional intelligence (EI), social intelligence (SI), and practical intelligence (PI). The definition and measurement of each construct is reviewed and the extent to which each actually meets the criterion for the "intelligence" designation is discussed. We also consider issues of how distinct these three intelligences are from one another.

In Section 6.2 some background information about each construct is given. Section 6.3 covers their measurement, and in particular considers the issue of performance versus self-report measures, which is currently an area of intense debate in EI research. Following a brief discussion of the extent of overlap of these constructs in Section 6.4, Section 6.5 sets out the definition of the term *intelligence* that we will adopt, taken directly from findings on psychometric intelligence; the extent to which each candidate intelligence matches this definition is then considered. The chapter ends with a general discussion and suggestions for future research in this area.

6.2 DEFINITION AND MEASUREMENT OF SOCIAL, PRACTICAL, AND EMOTIONAL INTELLIGENCE

6.2.1 Emotional Intelligence (EI)

Emotional intelligence provides a psychometric framework for the intuitive and appealing idea that people differ in their emotional skills and that these differences relate to real-life outcomes. For example, the superior interpersonal skills of high-EI individuals would be expected to lead to higher levels of career success, with EI having predictive power for this outcome over and above psychometric intelligence. EI has been defined in a variety of ways by different researchers. All EI models do, however, have overlapping core features comprising both intrapersonal (e.g., mood regulation, stress management) and interpersonal (e.g., emotion perception, social skills) components. EI has been characterized by some researchers as an ability (involving the cognitive processing of emotional information) which is therefore most appropriately measured by ability tests (e.g., Mayer, Caruso, & Salovey, 2000). An alternative approach assumes that EI represents a broad constellation of cognitive and non-cognitive components underlying emotions that can be measured by self-report questionnaire (e.g., Bar-On, 2000).

6.2.2 Social Intelligence (SI)

Social intelligence appears to have been first described as a performance construct by Thorndike in 1920. Together with abstract, verbal, practical, and/or mechanical intelligence, social intelligence was viewed as one of several interconnected but distinct intellectual abilities. Social intelligence was more specifically related to the capacity to understand, interact, and deal with people. The

debate over the existence and relevance of social intelligence has been more or less active over the ensuing 80 years following Thorndike's pioneering statement. Matarazzo (1972) asserted that "we do not believe in such an entity... social intelligence is just general intelligence applied to social situations" (p. 209). However, the more recent multifactor intelligence theory proposed by Gardner (1993) has described three categories of intelligence: object-related, object-free, and person-related intelligences. Interpersonal and intrapersonal intelligence fall into the third category. Thus, both of the former focus on the capacity to understand and interact with others, whilst the latter relates to the construction of an accurate self perception that, in turn, can be used to effectively plan and direct a person's life. Also, in recent years, the social intelligence theme has been recast under such labels as social knowledge, social performance, social skills, and social competence (also see Chapter 10 by Weis & Süß). The latter description includes social intelligence and the acquisition of social skills, but also cognitive features related to social self-regulation, as well interpersonal personality traits (Schneider, Ackerman, & Kanfer, 1996). The measurement of social intelligence includes a mix of both performance-based and self-report scales that tap various cognitive and behavioral variables.

6.2.3 Practical Intelligence (PI)

Practical intelligence relates to the ability to deal with real-life problems, which are relatively unrelated to the more academic abilities assessed by IQ tests (Sternberg & Grigorenko, 2000). A more formal definition of the construct is: "Intelligence that serves to find a more optimal fit between the individual and the demands of the individual's environment, by adapting to the environment, changing (or shaping) the environment, or selecting a different environment" (Hedlund & Sternberg, 2000, p. 150). Advocates of PI argue that its association to problem solving in the real, as opposed to the academic, world means that it should act as a predictor of life success with incremental validity over psychometric intelligence. Studies of PI have involved the examination of both practical problem-solving skills and tacit knowledge. Tacit knowledge (TK), defined as knowledge which is relevant to a given situation, which is not formally acquired, and is procedural rather than declarative, has been identified as an important component of PI (Sternberg, Wagner, & Okagaki, 1993).

6.3 MEASUREMENT ISSUES

As mentioned above, instruments for the assessment of EI and SI using both self-report and performance methods have been devised. PI measures can be performance-based, for example requiring participants to deal with a simulated version of a workplace situation, but testing by self-report methods is also possible. Whilst self-report measures for new constructs can readily be devised using principles that have been established for assessing existing ones (e.g., personality), the construction of performance measures presents difficul-

ties. Psychometric intelligence is a theoretically well-founded construct, which means that devising tests that have unambiguous right and wrong answers to assess any intelligence domain is a well-defined procedure; the existence of items with well-defined correct answers is regarded as an essential component of intelligence testing (Guttman & Levy, 1991; Most & Zeidner, 1995). For the candidate intelligences discussed in this chapter the problem of defining right answers is a more complex one, which we discuss in more detail in the passages that follow. In addition, the assessment of a construct by two very different measurement methods raises issues of whether the same construct is being measured. Naming the output from a self-report measure such as the EQ-i (Bar-On, 2000) and from a performance measure such as the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2000) as both measuring emotional intelligence rather pre-empts the issue (also see Chapter 2 by Neubauer & Freudenthaler). To resolve this discrepancy, Petrides and Furnham (2000, 2001) have proposed the labels trait (self-report) EI and ability (performance) EI; their work also draws attention to the issues of typical versus maximal performance which underlie the two measurement approaches (also see Chapter 9 by Pérez, Petrides, & Furnham). The same distinction could usefully be applied to measures of other new intelligences.

6.3.1 EI Measurement

A number of ability EI measures have been devised. Problems with such measures are related to difficulties in identifying the right answer to an EI problem, in the absence of a method for generating objective criteria to define the correct solution. The two main scoring systems which have been devised are expert scoring and consensus scoring (see Chapter 8 by Legree, Psotka, Tremble, & Bourne). The ability of EI experts to determine correct answers would appear to be problem-dependent. Thus, determining the correct answer to a facial expression recognition task appears relatively straightforward, whilst a problem involving complex social interactions presents greater difficulties. This problem is exacerbated by the fact that social behavior is determined by contextual and cultural factors, meaning that the concept of a right response is less well-defined (Matthews, Zeidner, & Roberts, 2002). It is also unclear whether EI researchers, who tend to be responsible for devising expert scoring criteria, actually qualify as emotional experts. Consensus scoring seeks to avoid these problems by defining the right answer as the response most frequently endorsed by a large normative group. Again, this scoring method appears vulnerable to ignoring situational and cultural effects, although use of different norms according to age, gender, and culture is possible. A second objection to this method is that it appears to be more applicable to simple emotional problems than to difficult ones. For example, again, facial expression recognition would appear to be appropriate for consensus scoring, but subtle problems of social interaction presumably need above-average EI abilities for their solution, so the group consensus here is likely to be actually incorrect (Matthews et al., 2002). In an extensive study of a performance EI measure, the Multi-

factor Emotional Intelligence Scales (MEIS; Mayer, Caruso, & Salovey, 1999), Roberts, Zeidner, and Matthews (2001), in addition to considering the general issues discussed above, identified specific problems: low sub-scale reliabilities, relatively low correlations between consensus and expert scores, and dependence of group differences on scoring method.

There are also problems associated with the assessment of EI by self-report. Thus, whilst questionnaire measures of EI are generally reliable and can be scored unambiguously, there are difficulties associated with consistent findings of medium to large correlations with personality measures. As an example, the aggregated results from a series of studies by the present authors (Austin, Saklofske, Huang, & McKenney, 2004; Saklofske, Austin, & Minski, 2003; Saklofske & Austin, 2004) with a combined N of 1422 give correlations of $-.29$ with Neuroticism (N), .44 with Extraversion (E), .25 with Openness (O), .41 with Agreeableness (A) and .26 with Conscientiousness (C). These results are consistent with the EI/personality correlations reported in a meta-analysis by Van Rooy and Viswesvaran (2004). In addition to this clear overlap between trait EI and personality, the idea that people are actually able to self-report on their emotional abilities has also been questioned (Bowman, Markham, & Roberts, 2002).

6.3.2 SI Measurement

As with EI, research on SI has employed both performance-based and self-report measures. While Legree (1995) presents arguments for the use of expert or consensus scoring for social intelligence measures, many of the current measures tapping SI appear to be based either on self-report or gleaned through informal measures that might draw from observation, interview or even extant records. A recent study by Weis and Süß (see Chapter 10) examined the potential relationship between self-report measures of social cognitive and behavioral skills, several performance measures of SI, and hypothetically related personality traits. They concluded that there was no support for the convergent construct validity of self-report and performance-based SI measures.

In the clinical context, specific subtests from the Wechsler intelligence scales have often been considered to tap social intelligence. One common example is the Picture Arrangement subtests found on the child and adult versions of this test. However, there is little evidence to support this contention, leading Kamphaus (1998) to argue that "a Picture Arrangement subtest score should not be interpreted as a measure of social judgment" (p. 54). The measurement approach recommended by practitioners who subscribe to Gardner's (1993) views of Multiple Intelligences include a pot pourri of data collection methods ranging from portfolio, observation, work samples, and self-report descriptions. While this approach has gained considerable acceptance in educational settings, it does not meet the criteria for sound psychometrically grounded measurement. The difficulty here is that the answer to the measurement question rests in the definition of the construct to be measured or assessed. Unfor-

tunately, to date, consensual definitions of SI have not been forthcoming in the literature.

6.3.3 PI Measurement

A number of PI and TK tests have been developed (Sternberg & Grigorenko, 2000). Whilst the scoring procedure for practical problem solving tests is generally well defined, TK test scoring is subject to the same problems as performance EI scoring. A typical TK test involves choosing between or ranking alternative courses of action when confronted with a work-related situation (e.g., Wagner & Sternberg, 1985), leading to a requirement of defining the right choices. One method used to achieve this is again expert scoring, with correct answers being defined by high performers in the domain of interest. This scoring method would appear to be less problematic than for EI, as there are reasonably objective criteria, for identifying experts. An alternative approach to scoring is to examine response differences between expert and less expert groups.

6.4 OVERLAPS AND DIFFERENCES BETWEEN SI, PI, AND EI

It is clear from the definitions of these constructs that there is some degree of overlap between them, although in there is currently a dearth of studies in which all three (or any pair) have been directly compared. The study of Davies, Stankov, and Roberts (1998) found no significant correlations between EI and SI measures. By contrast, the work of Weis and Süß (Chapter 10, this volume) shows EI, SI and TK measures loading in theoretically interpretable ways on social understanding, social memory and social knowledge factors. These communalities clearly require further investigation. The issue of ability and trait measures discussed above is also relevant, for example if a performance-based definition, as originally envisaged by Thorndike, of SI is adopted, SI would be expected to show stronger correlations with ability EI than with trait EI.

Although overlap is expected, the definitions of EI, PI, and SI do suggest the existence of some differences between them, which we now discuss in more detail. EI is explicitly defined as having both inter- and intrapersonal components; the existence of these two strands, allowing incorporation of individual differences in, for example, mood regulation and stress management, make it appear a richer construct than SI or PI, since the latter do not explicitly cover any type of internal regulatory processes. SI is defined primarily in terms of inter-personal skills and knowledge of social rules and conventions, so SI would appear to have some overlap with the interpersonal aspects of EI. Some distance between SI and EI is, however, suggested by results on different links to conflict behavior, with SI being found to relate positively to aggressive behavior as well as to peaceful conflict resolution, whereas empathy, an im-

portant EI component in many models, is associated more strongly with non-aggressive resolution strategies (Björkqvist, Österman, & Kaukiainen, 2000). The descriptions of PI and SI differ from EI in not being conceptualized as being specifically emotional. Moreover, PI does not even explicitly relate to inter-personal skill; there may, however, be an implicit component of PI, that is, it represents one of the ways of acquiring tacit knowledge, specifically, by socializing well in order to be optimally placed to learn skills from other individuals.

6.5 DO SI, PI, AND EI COUNT AS INTELLIGENCES?

6.5.1 Criteria for a Construct To Be "an Intelligence"

Extensive study of human ability differences has lead to a consensus on the structure of psychometric intelligence (Carroll, 1993). The accepted model of psychometric intelligence has a hierarchical structure, with general ability *g* at the top stratum, group factors at the second stratum, and specific factors at the third stratum. For a new intelligence to qualify as a candidate, it should (ideally) fit into this structure, possess a similar degree of predictive validity to that found for other forms of psychometric intelligence, and also show links to underlying biological and cognitive processes. In addition, the candidate intelligence should be well defined, in the sense that it can be operationalized as a cognitive ability, that is, a clear link between an intelligence and the kind of problems it is used to solve can be established. It is also expected that the problem-solving should be linked to purely cognitive processes such as verbal fluency, pattern completion, and so forth. Within the traditional formulation of psychometric intelligence, modes of problem-solving linked to dispositional or cultural factors are excluded, with this exclusion being linked to the idea that intelligence test problems should have unique right answers. In the following sections the current status of psychometric intelligence is discussed in more detail with reference to these criteria, and SI, PI, and EI are compared with psychometric intelligence in these respects.

Correlations with other intelligence measures and with non-intelligence measures: Convergent and discriminant validity. The existence of positive manifold—that is, positive correlations amongst both group factors and specific factors—underpins the hierarchical model of intelligence discussed above. New intelligences are therefore expected to fit this model by correlating positively with existing ones; such correlations should be large enough to be meaningful, whilst not being so large that the new intelligence is indistinguishable from an existing one. If SI, PI, and EI are to fit in the existing hierarchy, one possibility is that each construct would be at the second stratum; that is, as group factors, with, for example, EI subcomponents forming specific factors. Alternatively, these constructs might fit at the third stratum; for EI Matthews et al. (2002) discuss the evidence that it can be regarded as a sub-component of crystallized ability, whilst for PI Gottfredson (2003) argues that the specificity

of current measures place them also in the third stratum. Psychometric intelligence also meets discriminant validity criteria; the modest size of correlations between intelligence measures and personality traits (Ackerman & Heggestad, 1997) shows that intelligence and personality address distinct aspects of the psychological differences between individuals; again there would appear to be a requirement for SI, PI, and EI to show similar distinctness.

Criterion and predictive validity. Psychometric intelligence has good predictive validity for life outcomes in areas where these associations would be expected on theoretical grounds, in particular educational and career success (Gottfredson, 1997; Neisser et al., 1996; Schmidt & Hunter, 1998). SI, PI, and EI would be expected to show similar predictive ability for appropriate theoretically linked outcomes. There are also issues of incremental validity, that is, new intelligences should give enhanced predictive power over old ones. As an example of an incremental validity exercise, regression models using psychometric intelligence and EI separately and combined as predictors of career success, and so forth, could be compared. Each variable alone would be expected to have some predictive ability; a key test of the usefulness of EI is whether it adds significantly to the predictive power of psychometric intelligence. This question can be addressed by comparing R^2 measures for models with psychometric intelligence alone and psychometric intelligence and EI as predictors. Consistent findings of no significant improvement in predictive ability with a range of outcomes would suggest that the new intelligence is not measuring anything different from the old one.

Biological associations and associations with lower-level cognitive tasks. Psychometric intelligence is known to be highly heritable (Plomin & Petrill, 1997), suggesting that there is a biological contribution to intelligence differences. Evidence pointing in the same direction linking intelligence to speed of information processing comes from findings on associations between psychometric intelligence and faster performance on reaction time and inspection time tasks, and event related potential differences between low- and high-*g* individuals, although the mechanisms for these associations are not well understood (Deary, 2000). Similar genetic and biological associations should be sought for new candidate intelligence measures; to date no systematic attempts at uncovering the biological and lower-level cognitive mechanisms underlying EI, SI and PI have been reported.

6.5.2 EI as an Intelligence

For ability EI, there is accumulating evidence of reasonably sized positive correlations with conventional psychometric intelligence measures (Mayer et al., 1999; Roberts et al., 2001). Associations appear to be stronger for crystallized than for fluid ability measures, an observation suggesting that EI may overlap more with acculturated than with fluid abilities (Bowman et al., 2002). Mayer et al. (1999) argue that performance EI can be operationalized as a set of abil-

ities in a manner analogous to psychometric intelligence, although it should be noted that, as discussed above, there is some controversy and disagreement about the methods of scoring emotional performance problems (Matthews et al., 2002). By contrast, trait EI measures show small or zero correlations with psychometric intelligence (e.g., Derksen, Kramer, & Katzko, 2002).

Turning to issues of discriminant validity, ability EI measures show small or zero correlations with personality (Roberts et al., 2001; Mayer et al., 2000). By contrast, trait EI measures show medium to large correlations with personality, and the extent to which trait EI is distinct from personality is a topic of current debate in the literature. Some part of the correlation patterns observed for trait and ability EI may be due to common method variance. There is also the possibility that trait EI may relate to ability EI in the same way that self-reported intelligence relates to intelligence objectively assessed by IQ tests. Here the finding is that self-reported intelligence correlates at around .30 with IQ (e.g., Furnham, 2001). These findings indicate that people can report on their own ability level to some imperfect extent, notwithstanding the response biases inevitable in self-assessing this most socially desirable characteristic. Similar considerations may well apply to EI; whilst respondents will presumably believe high EI to be desirable, they may be capable of making some kind of realistic assessment of how emotionally intelligent they actually are.

In terms of the predictive validity of EI, positive associations with happiness, life satisfaction, and social network size and quality and negative associations with depression, depression-proneness, and loneliness have been found (Austin et al., 2004; Ciarrochi, Chan, & Bajgar, 2001; Dawda & Hart, 2000; Saklofske et al., 2003; Schutte et al., 1998). A summary of the small number of studies which have addressed this issue (Matthews et al., 2002), however, suggests that the incremental predictive validity of ability EI with psychometric intelligence controlled for, and of trait EI with personality controlled for, are both small.

Tables 6.1 and 6.2 summarize some results from our own research in which the incremental validity of trait EI was assessed using regression modelling. The group of variables happiness, life satisfaction, loneliness and social networks would all be expected to relate to EI (negatively in the case of loneliness, otherwise positively) because of the superior inter-personal skills of high-EI individuals. A negative relationship between depression-proneness and EI would be anticipated because of intrapersonal EI skills such as mood management. The final set of variables, all related to health behaviors would also be expected to show associations with EI, with high-EI individuals tending to take better care of their health, although the arguments for this are less direct and assign a coping style-like role to EI. As an example, inter-personal EI skills would be expected to facilitate resistance to peer pressure to consume excessive amounts of alcohol (Trinidad & Johnson, 2002), whilst at the same time making high-EI individuals more receptive to guidance on alcohol consumption from health professionals and others. In addition, intrapersonal EI skills such as mood regulation might be expected to reduce the need to use al-

Table 6.1 Correlations of EI With Theoretically-Linked Outcomes

	Study 1	Study 2	Study 3
Happiness	.45***		
Life Satisfaction	.39***	.30***	.30***
Loneliness (family)	−.29***		
Loneliness (social)	−.33***		
Loneliness (romantic)	−.19***		
Depression proneness	−.38***		
Social network size		.36***	
Social network quality		.17**	
Alcohol consumption		−.19*	−.07
Exercise			.12*
Self-reported health		−.02	.01
Number of doctor's visits		−.03	.10
Alternative health treatment use			.11*
Healthy diet			.17**

Notes. Study 1 (Saklofske et al., 2003) $N = 354$, Study 2 (Austin, Saklofske, & Egan, 2005) $N = 704$, Study 3 (Saklofske & Austin, 2004) $N = 364$.
* $p < .05$, ** $p < .01$, *** $p < .001$.

cohol as a means of mood management. The correlations in Table 6.1 confirm some associations are indeed found between EI and positive health behaviors, as well as associations in the predicted direction with the social variables and depression. These correlations are, however, difficult to interpret. Personality traits also correlate significantly with the Table 6.1 outcomes, which suggests that the correlations may partly be accounted for by the common associations amongst EI, personality and outcomes. Regression modelling can be used to test these ideas, by identifying the most salient predictors for each outcome. In addition, the incremental validity of EI can be assessed by comparing models with personality traits as predictors with and without the additional inclusion of EI; the change in R^2 between the two models provides an incremental validity measure. Our general finding has been that there are cases where EI has some degree of incremental predictive validity over personality, but the increases in R^2 are not large.

Table 6.2 shows the result of using regression modelling to identify the significant predictors of each outcome. It can be seen that EI does appear as a predictor in several models and in particular is the best predictor of social network size and of taking exercise. The result for social network size is of particular interest since this provides a good match to the theoretical idea that high-EI individuals should have more and better quality relationships with friends, colleagues, and family. By contrast, self-reported social network quality is determined by personality, appearing to fit the general tendency of individuals who are high on Neuroticism to report dissatisfaction with all aspects of their lives. The mechanism by which EI relates to exercise behavior is less obvious but, as with the example of alcohol consumption discussed above,

Table 6.2 Significant Regression Predictors

	Study 1	ΔR^2	Study 2	ΔR^2	Study 3	ΔR^2
Happiness	E(+)N(–)A(+)EI(+)	1.3				
Life Satisfaction	N(–)EI(+)E(+)	1.8	N(–)	2.9	N(–)E(+)EI(+)	3.2
Loneliness (family)	N(+)A(–)EI(–)O(–)	1.4				
Loneliness (social)	N(+)E(–)EI(–)	1.3				
Loneliness (romantic)	N(+)EI(–)	1.2				
Depression proneness	N(+)E(–)O(+)EI(–)	1.0				
Social network size			EI(+)	5.0		
Social network quality			N(–)	0.1		
Alcohol consumption			E(+)	3.9	E(+)	0.5
Exercise					EI(+)	0.2
Self-reported health			N(–)A(+)	3.1	E(+)N(–)	0.3
Number of doctor's visits			C(+)	1.2		
Alternative health treatment use					O(+)	0.6
Healthy diet					A(+)C(+)	0.9

Note. $\Delta R^2 = R^2$ change (%).

could relate to both interpersonal (positive social aspects of sporting activities) and intrapersonal (using exercise for mood regulation) facets of EI. For each outcome the change in R^2 between models using the five personality trait scores as predictors and models using EI in addition to personality is shown (see columns labelled ΔR^2). It can be seen that all these values are small, with the largest being 5% and several below 1%, suggesting that the incremental validity of trait EI over personality does give cause for concern. For exercise behavior two structural equation models were compared. A model in which EI mediates the effects of personality on exercise behavior is shown in Figure 6.1. This was compared with a regression model in which C, E, and EI contribute independently to exercise behavior, but with the correlation between E and C being retained. Comparison of the fit of the two models supported the mediating model ($\chi^2(2)$ was 3.7 for the mediating model and 57.0 for the regression model with respective mean standardized off-diagonal residual covariance matrix elements of 0.024, 0.12).

Possible explanations for the mediating role of EI are discussed above, essentially mediation might be expected if EI plays a similar role to coping style,

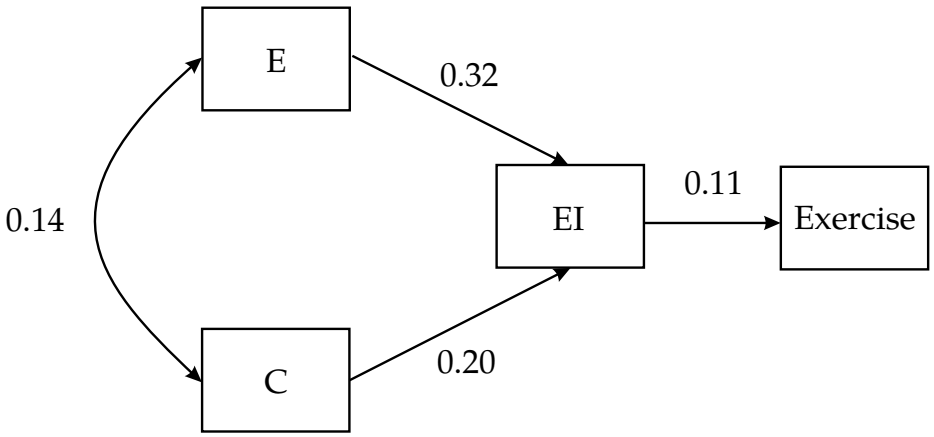

Figure 6.1 Model showing EI acting as a mediator of the relationship between personality and exercise.

which is often found to mediate personality/behavior associations (Deary et al., 1996). There are also studies showing that trait EI scores differ in the predicted direction between a range of criterion groups (Bar-On, 1997; Schmidt & Hunter, 1998). For example, therapists score significantly higher than therapy clients or prisoners, and more successful members of certain occupational groups have been found to have higher EI scores than their less successful counterparts. Trait EI has also been found to be a predictor of academic success in first-year university students (Parker, Summerfeldt, Hogan, & Majeski, 2004). This finding can be interpreted in terms of the usefulness of inter- and intrapersonal skills in dealing with the novel university environment, a point that administrators, for example, might find eminently useful, suggesting both that EI might be used alongside personality and ability tests when selecting university applicants and that emotional skills enhancement programs might form part of student support services.

Unlike PI and SI, there has been some progress in linking EI (or alexithymia, which is related to low EI; Parker, Taylor, & Bagby, 2001) to performance on tasks which assess individual differences in the processing of emotional information (Austin, 2004; Bates, 1999; Ciarrochi et al., 2001; Parker, Taylor, & Bagby, 1993a, 1993b; Petrides & Furnham, 2003). The trait approach to EI measurement raises the issue of whether people can self-report on their emotional skills without actually demonstrating them in the same way as it is known they can on their personality traits. In particular, does a person's response to an item such as "I find it easy to read people's facial expressions" bear any relation to their actual ability to read facial expressions during social interactions with others. From a more fundamental viewpoint, it seems plausible to suggest that individual differences in EI might in part be underpinned by individual differences in the speed of processing of emotional information.

The idea of a possibly biologically based information processing component to EI links to the information processing approach to psychometric intelligence discussed in Section 6.5.1. The existence of individual differences in emotion

Table 6.3 Correlations Amongst Computer Tasks And The NART

	NART	Happy-IT	Sad-IT	Symbol-IT
Happy-IT	−.09 (72)			
Sad-IT	.07 (72)	.42*** (92)		
Symbol-IT	.06 (72)	.48*** (92)	.46*** (92)	
Ekman-60	−.06 (67)	.40*** (87)	.33** (87)	.18 (87)

Notes. NART = National Adult Reading Test (total correct), Happy IT = happy face inspection time score (total correct), Sad IT = sad face inspection time score (total correct), Symbol IT = symbol inspection time score (total correct). *N* for each correlation is given in brackets.
** $p < .01$, *** $p < .001$.

processing speed and potential relationships with EI has not yet been widely investigated. The main objective of the study described in this section (Austin, 2004) was to examine the associations between scores on a trait EI measure and performance on speeded (inspection time [IT]) and unspeeded tasks involving the recognition of facial expressions of emotion. A second objective was to investigate the extent to which the speed of emotional information processing relates to the speed of processing of non-emotional information. In this study, 92 participants completed a trait EI scale and three IT tasks in which discriminations were performed between (a) happy and neutral faces, (b) sad and neutral faces, and (c) two emotionally-neutral symbols. Participants also completed a personality questionnaire and were assessed on the NART (Nelson & Willison, 1991), a measure of crystallized ability, and on an unspeeded facial expression recognition task.

Table 6.3 shows the correlations amongst the computer tasks and the NART. It can be seen that there are large significant correlations amongst scores on the three IT tasks. Both emotional inspection time tasks are also significantly correlated with the unspeeded facial expression recognition task (Ekman-60; Young, Perrett, Calder, Sprengelmeyer, & Ekman, 2002), whereas the symbol inspection time task is not. NART scores are not correlated with any of the computer tasks and personality traits were also found to be uncorrelated with emotional task performance. Overall EI and intrapersonal EI sub-factors were found to be uncorrelated with performance on any of the tasks but an interpersonal EI sub-factor assessing the ability to read the emotions of others was significantly correlated with performance on the two IT tasks involving emotional stimuli ($r = .22$ for happy faces, .25 for sad faces, both $p < .05$). The correlation between interpersonal EI and Ekman faces task performance was similar in size, although failing to reach significance with a slightly smaller sample size for this task ($r = .22$, $p = .055$). Since performance on the symbol IT task can be regarded as a measure of general processing speed, the effect of partialling-out symbol task performance on the correlation between the two emotional IT tasks was examined. This relationship remained significant ($r = .28$, $p < .05$), suggesting a contribution to the correlation related to the specific emotional content of the two tasks. Correlations between the Ekman-60 task and the two

emotional IT tasks also remained significant ($r = .40$, $p < .001$ for happy faces, $r = .28$, $p < .05$ for sad faces). Taken together, the correlations suggest that a common processing speed factor accounts in part for performance on the IT tasks. In addition, an underlying emotion-processing factor appears to contribute to emotional IT performance. The patterning of correlations with trait EI provides support for its validity, in that self-reports of interpersonal emotion perception ability are related to (interpersonal) emotion task performance, whilst self-reports of intrapersonal aspects of emotion management are unrelated to performance on these tasks. There is also evidence for discriminant validity from personality, in that personality, unlike EI, was found to be unrelated to performance on emotion-related tasks. Associations between trait EI and emotional information processing ability have also been reported by Bates (1999) and Petrides and Furnham (2003). From the findings discussed above, it seems reasonable to conclude that ability EI has many of the required features of an intelligence in terms of its general pattern of correlations with other measures. Trait EI does not fit the definition of an intelligence, but is weakly related to the ability to process emotion-related information. There is clearly scope for improvement of both ability and trait measures. For ability EI measures the issue of scoring, discussed earlier, needs to be addressed, whilst the development of trait EI measures which are more distinct from personality than current instruments would be highly desirable.

6.5.3 SI as an Intelligence

Whilst much of the earlier work on social intelligence produced confusing and contradictory results, leading many researchers to conclude that the construct was not worth studying, some recent work using established psychometric and modeling techniques, including confirmatory factor analysis (CFA) suggests a possible revival. A study by Lee, Wong, Day, Maxwell, and Thorpe (2000) provides evidence that SI divides into the domains of social-cognitive (understanding people, knowing social rules) and social-behavioral (being good at dealing with people). This study also provides evidence supporting both the existence of fluid and crystallized SI and of SI fitting into the intelligence hierarchy, with SI measures showing reasonable sized correlations with academic intelligence. A study by Legree (1995) similarly derived a separate social intelligence factor with CFA indicating a hierarchical factor structure with SI loading on *g* along with verbal, speed, quantitative and technical factors. These results suggest that like ability EI, SI, appropriately defined and measured, has intelligence-like attributes (see Chapter 10).

The ongoing debate during much of the 20th century over the relevance and need for a description of social intelligence to both complement but also extend other descriptions of intelligence has not yet achieved any kind of consensus. Certainly social knowledge, understanding, and application are already reflected in many of the subtests assessing crystallized abilities found on the Wechsler scales (e.g., Comprehension, Picture Arrangement). Once the concept of SI includes social self-regulation and personality traits, it might ap-

pear to be better described within a framework of contemporary social cognitive models (Matthews, Schwean, Campbell, Saklofske, & Mohamed, 2000) and measured possibly as both an ability and trait, following current practices in the assessment of EI. Whether social intelligence is akin to the specific kinds of intrapersonal and interpersonal intelligences described by Gardner, a reflection of various cognitive abilities underlying social themes, a link or bridge between personality and intelligence, or more properly viewed as a part of personality seen from both a trait and social cognitive perspective, remains to be seen. Current research efforts need to be directed at both isolating a SI factor (whether a major or group factor) and also demonstrating its relevance to the description of individual differences.

6.5.4 PI as an Intelligence

Whilst a number of specific, situation-based tests of practical problem solving and tacit knowledge have been constructed for particular groups (e.g., managers, the military), no general-purpose PI test is currently available. This may appear a difficult objective given the domain-specificity of PI, but within a framework where TK acquisition abilities are postulated to underlie PI, a general-purpose TK skills instrument would appear to be feasible. In order for PI to be fully assessed for its fit with the intelligence hierarchy, it is necessary to measure individual differences in the implied underlying cognitive ability that allows individuals to acquire domain-specific PI skills. At present there is no test battery available that would enable a general PI factor of this nature and PI subcomponents to be extracted and examined for predictive validity and correlations with other intelligence measures (Gottfredson, 2003).

In terms of establishing correlations of existing PI measures with psychometric intelligence, the findings to date present problematic features. PI and TK test performance have been reported to have negligible or even negative correlations with psychometric intelligence (Sternberg & Grigorenko, 2000), which would preclude the inclusion of PI in the intelligence positive manifold. Evidence of criterion/predictive validity has been found with PI being, for example, positively associated with a range of career success measures in academic psychologists and business managers (Wagner & Sternberg, 1985). A detailed survey of the published PI literature (Gottfredson, 2003) has, however, questioned results on PI obtained to date. The issues raised by Gottfredson, some of which are also pointed out by Bowman et al. (2002), include the use of small samples, inconsistent findings, restriction of ability range in the groups studied, the lack of a general-purpose PI instrument, and difficulties in generalization from the results obtained on the narrow range of occupational groups studied. She also suggests that the gulf between academic and practical intelligence is not as wide as has been suggested with, for example, many conventional IQ tests having tacit knowledge aspects, and academic ability having predictive power for the ability to solve real-life practical problems. Gottfredson's review also raises an interesting issue related to the discriminant validity of PI from personality that merits attention. Tests designed to assess the tacit

knowledge required to succeed in a particular career may well also tap into traits linked to pursuing one's own interests and creating a good impression with superiors; in this context studies of associations between TK tests and traits such as Machiavellianism (Christie & Geis, 1970) and impression management (Paulhus, 1984) would be of interest.

Given the relatively sparse data on PI currently available and the intense debate over its interpretation (Gottfredson, 2003; Sternberg, 2003) the question of whether PI does fit into the intelligence manifold is perhaps best regarded as open whilst further results are awaited. PI nonetheless appears to be potentially useful for predicting real-world success, and merits further study and the gathering of more data for this reason, as well as in order to establish its associations with other intelligence measures.

6.6 DISCUSSION

6.6.1 Are EI, SI, and PI "Intelligences"?

For all three constructs it is perhaps unfortunate that the label *intelligence* has been applied to them in advance of supporting evidence being obtained. From the literature reviewed here it appears that ability EI shows a correlation pattern that should allow it to be fitted into the psychometric intelligence manifold, with trait EI being located closer to the personality domain. There is some similar evidence for SI as an intelligence, but establishing the position for PI seems to require more work, as indeed is also required to clarify the status of EI and SI.

The application of the *intelligence* label to new constructs also points to some areas where individual difference researchers may perhaps be thinking too simplistically. Firstly, are we obliged to call everything that predicts real-life success an intelligence? The best counter-example here is the personality trait of Conscientiousness, which is a predictor of career and academic success (e.g., Hurtz & Donovan, 2000; Paunonen & Ashton, 2001) but is clearly a personality trait, not an intelligence. Secondly, the idea of defining either "intelligences" or personality traits as globally adaptive once we move away from the solid ground of psychometric intelligence is hard to defend. Situational factors can clearly play a role in what is adaptive and what is not. For example, the EI subcomponent of empathy could be adaptive in some situations (understanding a partner's or friend's feelings and acting upon that knowledge to enhance the relationship) and maladaptive in others (pursuing career success in a competitive environment where too much understanding of and concern for the feelings of others may impede one's own progress).

6.6.2 How Do These "Intelligences" Interrelate?

Whilst EI, PI, and SI clearly have some degree of overlap, it is hard to draw definite conclusions on how extensive this might be, given the current lack of

comparative studies. There is an urgent need for large-scale studies in which all three are assessed together and tested against each other as predictors of real-life outcomes. Such studies should where possible include both trait and performance measures. Hedlund and Sternberg (2000) have made the interesting suggestion that EI, PI, and SI can all be integrated within a tacit knowledge framework. It seems problematic to justify this position experimentally based on the present findings on TK, given (a) the lack of a general-purpose measure of TK and (b) the lack of work on correlations between measures of EI, SI, and PI. Nonetheless, this argument is theoretically appealing, in that emotional and social abilities can be hypothesized to be acquired by the tacit learning route in an analogous manner to that proposed for practical skills. In this formulation the intra- and interpersonal aspects of EI would be regarded as comprising tacit knowledge about managing oneself and managing others respectively (Matthews et al., 2002).

6.6.3 Do These Constructs Have a Biological Underpinning?

Work on the biological basis of PI and SI is currently non-existent. Some progress is starting to be made with EI. Further work is needed on its underlying biological basis by further study of the relationships between both trait and ability EI scores and performance on lower-level emotion-processing tasks. This information processing approach has proved very fruitful in the study of psychometric intelligence and should be equally helpful in the study and validation of EI (and by extension PI and SI). One caution here is that initially the tasks should be selected from those for which the right answers are unambiguous, to avoid the scoring problems which have on occasion been found with ability EI measures (Matthews et al., 2002). For all three constructs, behavior genetic studies would also be of great interest; if any or all of them are established to be significantly heritable, this would in itself provide both evidence for underlying biological mechanisms and act as a starting point in the search for relevant genes. One promising initial finding on the biological basis of EI comes from a study (Bar-On, Tranel, Denburg, & Bechara, 2003), which has linked brain lesions that impair emotional signaling with both poor decision-making and low EI scores.

6.6.4 Measurement Issues

The trait/ability distinction is a potential issue for all three constructs but has been most fully developed for EI, to which we confine the discussion in this subsection. The distinction between trait and ability measures should be maintained, thereby avoiding fallacy of giving two different things the same name ("jingle", Block, 1995; Thorndike, 1904). The study of the relationships between the two forms of EI promises to be fruitful; it is clearly of interest to establish the extent to which people can self-report on their own emotional skills The relationships found between trait EI and emotional task performance described above show that trait EI can act as a measure of emotional process-

ing abilities, notwithstanding its overlaps with personality. An important argument for continuing to work on the development of trait EI measures is that testing by questionnaire is more straightforward and less expensive than the use of performance tests. Questionnaires can be mailed out to large samples and completed by respondents under unsupervised conditions, a major advantage compared to the usual supervised administration of performance tests. As discussed above, it is to be hoped that further work on questionnaire EI measures will produce scales which show less overlap with personality than the current generation of EI scales.

6.7 CONCLUSIONS

Much work remains to be done on establishing the nature, validity, and usefulness of EI, PI, and SI and it is likely that they will remain problematic for the foreseeable future. This is partly due to the gaps in research pointed out above, but also because they are all, to some extent, conceptualized as being on the cognition/emotion boundary. Such bridging constructs are not easy to fit into the individual differences perspective, which has tended to assign cognitive phenomena to intelligence and issues of dealing with emotions to personality. This is an over-simplified view, in that cognition and emotion clearly do overlap, as shown, for example, by evidence supporting Damasio's (1994) somatic marker hypothesis, which links impairments of decision-making with impaired emotional signalling. Part of the challenge of these new intelligences is that they suggest a change in our thinking about the links between cognition and emotion and also about what we mean by intelligent behavior. The question of whether the addition of EI, PI, and SI to the psychometric canon gives us too many intelligences cannot be resolved at present. More work on these constructs singly and in comparison with each other will be required to test their validity, usefulness and independence from one another.

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