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Abstract

The associations of reaction times (RTs) to the items of two trait emotional intelligence (EI) scales ($N = 242$, 191) and one ability EI measure ($N = 331$) with EI score were examined. For trait EI an inverted-U relationship between RT and score was found for both scales. This is consistent with the self-schema model of time to respond, with extreme scorers responding more rapidly. For ability EI there was no overall association between RT and EI, but high scorers responded more slowly than low scorers to difficult items.

1. Introduction

Current research on emotional intelligence (EI) encompasses two distinct measurement approaches and underlying theoretical models. Ability EI is regarded as a subcomponent of intelligence which can be measured by tests similar in design to conventional intelligence tests. Trait EI, assessed by self-report, is regarded as an emotion-related dispositional trait which is a lower-level component of personality (Petrides, Pita, & Kokkinaki, 2007).

Whilst there have been numerous studies of the correlates of both trait and ability EI, reaction times (RTs) for responses to EI items have not been studied. For trait EI a similar pattern of associations to those for personality would be expected. The time taken to respond to a personality item can be thought of as depending on two factors: baseline speed, i.e. individual differences in speed of responding which are unrelated to item content, and self-schema effects. Once baseline speed has been accounted for, the self-schema model (Markus, 1977) indicates that extreme scorers should respond more quickly than those with intermediate scores. This is because the process of comparing the item content with an individual's self-knowledge should be faster if the individual has a well-developed self-schema for the relevant trait, which will be the case for extreme scorers. This argument predicts an inverted-U relationship between RT and score, a relationship found in a number of studies (Akrami, Hedlund, & Ekehammar, 2007; Casey & Tryon, 2001; Fekken & Holden, 1992; Kuiper, 1981). The theoretical framework which regards EI as a dispositional trait suggests that the inverted-U relationship should also be found for trait EI.

For ability EI item RT measures the time required for an individual to determine the correct response option, which may depend both on EI level and on the respondent's strategy (e.g. guessing). Previous studies of intelligence test item RTs indicate that for some tests RTs for easy items are negatively related to total score, with either a weaker or no association for harder items, where the strategy adopted is more likely to vary with ability level (Lavergne & Vigneau, 1997; Neubauer, 1990; Rafaeli & Tractinsky, 1991; Vigneau, Caissie, & Bors, 2006).

The rationale for the research described here was to examine whether trait and ability EI item RTs show the same pattern of associations with test scores as has been found for personality and intelligence tests. From the above discussion the expectation is for an inverted-U relationship between EI score and RT and a negative association between total score and RT for easy but not for hard ability EI items.

2. Method

2.1 Participants

The participants were 378 Edinburgh University students (268 female); the mean age of the group was 22.02 years, standard deviation 4.55 years.

2.2 Materials

2.2.1 Situational Test of Emotional Understanding (STEU; MacCann & Roberts, 2008). The items for this ability EI test were derived from Roseman's (2001)

appraisal-based emotion model in which the emotion felt by a person is derived from their appraisal of their situation. The test has 42 five-choice items which test respondents' knowledge of which emotion is most likely to be felt in situations covering 14 emotions. Because the test items are derived using a theoretical model, the STEU is veridically scored. Details of the development of the STEU and evidence for its reliability and validity are given by MacCann and Roberts (2008). The validity evidence includes correlations of STEU scores with intelligence, other ability EI tests, and emotion-related criteria such as life satisfaction. In the present study the STEU items were presented individually on a computer screen with responses being indicated using a response box and, as recommended by Fazio (1990), participants were instructed to respond as quickly as possible without sacrificing accuracy.

2.2.2 Trait EI. The items of two trait EI tests were presented on a computer as described above for the STEU. One test used a subset of 22 items from the modified version of the Schutte et al. (1998) EI scale (SSRI) described by Austin, Saklofske, Huang, and McKenney (2004). These were the items which loaded on this scale's two strongest factors. The second test was the 30-item TEIQue-SF (Petrides & Furnham, 2006). The five-point response scale of the SSRI was retained; for the TEIQue, the usual seven-point scale was replaced by a two-choice (Agree/Disagree) format. A series of non-emotional filler items (10 per test) were placed at intervals amongst the EI items. The RTs for these items were used in the subsequent analyses to control for baseline speed of responding (Fazio, 1990).[1]

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[1] A list of these items is available from the author.

2.3 Procedure

The data were gathered as part of three studies of associations of EI with other measures not discussed here. The recruitment procedure was identical for each study, via advertising on a website which could be accessed by all students within the university. In each study participants were tested individually in a quiet room.

3. Results

Analysis of group differences for the three studies showed no significant differences in age, test scores or proportions of males and females, and the data were merged for subsequent analysis. The internal reliabilities of the EI measures were SSRI .87, TEIQue .81, STEU .78.   Since no factor analysis of the STEU has yet been reported, its factor structure was examined; the scree diagram showed a large break between the first and second eigenvalues, suggesting the extraction of a single factor corresponding to the STEU being a unidimensional scale; the majority of the items had large loadings on this factor.

Descriptive statistics and correlations amongst the study measures are shown in Table 1. Trait EI scores were uncorrelated with STEU score but significantly correlated with one another.

Table 1 near here

The RT distributions for each set of items were normalised using a log transform. Mean RTs were then calculated for each trait EI scale and for the two sets of filler items. For the STEU, mean RT was calculated using only correct responses, to control for possible differences in the processes that underlie correct and incorrect responses (Lavergne & Vigneau, 1997). Correlations amongst the RTs were all positive and significant (range .62-.86). STEU score was not significantly correlated with mean STEU item RT, or with the mean RT for easy items (correctly answered by 85% or more of respondents). For hard items (correctly answered by 45% or less of respondents) there was a positive and significant correlation between STEU score and RT ($r = .21$, $N = 316$, $p < .001$).

Both trait EI scale scores were significantly negatively correlated with mean item RT ($r = -.23$, $p < .001$, $N = 242$ for the SSRI and $r = -.17$, $p = .02$, $N = 191$ for the TEIQue), but were uncorrelated with filler item RT. The trait EI/RT correlations increased when filler RT was partialled out ($r = -.39$, $-.35$ respectively, both $p < .001$). In order to examine the association between trait EI and item RT in more detail, Z-scores and their squares and cubes were calculated for each EI scale and used as predictors of RT in regression models. This use of centred variables is recommended in order to reduce multicollinearity (Cohen, Cohen, West, & Aiken, 2003, p204). To control for baseline speed, filler item RT was also entered as a predictor. The results, presented in Tables 2 and 3, show EI score and squared EI score were significant predictors of RT, with the sign of the quadratic term indicating an inverted –U relationship. Adding cubed EI score did not produce a significant increase in R^2 for either model. For the EIS regression analyses were also performed for its two subscales (Optimism/Mood Regulation and Appraisal of Emotion). The results were

similar to those for total score, i.e. an inverted-U relationship of subscale score with

mean RT for the relevant subset of items, controlling for filler item RT, but for the

Appraisal subscale the quadratic term was only marginally significant ($p = .055$)[2].

Tables 2 and 3 near here

4. Discussion

These results provide new information about the associations of trait and ability EI

item RTs with total score, and allow these associations to be compared with previous

findings for personality and intelligence test items.   As would be expected, different

patterns of associations were found for trait and ability EI. For trait EI an inverted-U

relationship between RT and score was found. This is consistent with the self-schema

model of speed of responding to personality items (Markus, 1977) and thus supports

the placement of trait EI within the personality domain (Petrides et al., 2007). The

inverted-U relationship was robust across two different tests and also across two

response formats, being found for both a five-point and a two-point response scale.

For the ability EI STEU there was no evidence of an overall association of

response speed with total score, and the finding for some intelligence tests of a

negative association of RT with score for the easier items was not replicated. For

harder items there was a positive association, suggesting that high scorers succeed

with these items by spending more time considering them. Given the diversity of

item types and content of the currently available ability EI tests, this result cannot be

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[2] Details of these analyses are available on request.

regarded as likely to prove general, since response strategies and their outcomes in associations between RT and ability level are likely to vary with the type of item and the response format, but the contrast between the results for the STEU and two trait EI measures provides further support for the distinctness of trait and ability EI. These results also link to the distinction which has been made between assessment of EI by typical (TP) and maximal (MP) performance methods and indicate that as well as differing correlation patterns of TP and MP scores with personality and intelligence (Freudenthaler & Neubauer, 2007), the processes underlying responses to TP and MP items differ.

Because the above findings relate to a student sample, it would be desirable to replicate this work using a general population sample, particularly with respect to ability EI, where restrictions of score range are possible amongst students. In the case of ability EI, the study of RTs in a wider range of tests is also desirable since the possibility that associations between RTs and test scores may vary between different tests should be investigated.

Acknowledgements

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Table 1. Descriptive statistics and correlations

	N	Mean	Standard Deviation	2	3
1. SSRI	242	85.65	11.24		
2. TEIQue	191	52.55	4.74	.62*** (191)	
3. STEU	331	28.46	3.75	.03 (195)	-.04 (144)

Sample sizes vary between measures due to data from three studies being merged.

Scores for the TEIQue cannot be compared to those from other studies using this test

due to the use of a 0/1 response format for the computerised version of the test. *** *p*

< .001.

Table 2. Regression model for SSRI reaction time

	B	Standard error	β	*t*	*p*
Constant	.90	.26	-	3.51	.001
Filler RT	.89	.031	.86	28.80	$< .001$
EI	-.06	.009	-.25	-7.06	$< .001$
EI^2	-.013	.005	-.10	-2.73	.007

$N = 242$, $R^2 = .79$.

Table 3. Regression model for TEIQue reaction time

	B	Standard error	β	*t*	*p*
Constant	1.92	.29		6.75	$< .001$
Filler RT	.77	.04	.83	21.58	$< .001$
EI	-.07	.01	-.28	-6.09	$< .001$
EI^2	-.02	.01	-.15	-3.23	.001

$N = 191$, $R^2 = .72$.