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Brief Report

Distinct emotional abilities converge: Evidence from emotional understanding and emotion recognition through the voice

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ABSTRACT

One key criterion for whether Emotional Intelligence (EI) truly fits the definition of "intelligence" is that individual branches of EI should converge. However, for performance tests that measure actual ability, such convergence has been elusive. Consistent with theoretical perspectives for intelligence, we approach this question using EI measures that have objective standards for right answers. Examining emotion recognition through the voice—that is, the ability to judge an actor's intended portrayal—and emotional understanding—that is, the ability to understand relationships and transitions among emotions—we find substantial convergence, $r = .53$. Results provide new data to inform the often heated debate about the validity of EI, and further the basis of optimism that EI may truly be considered intelligence.

1. Introduction

The concept of Emotional Intelligence (EI) has captured the attention of scholars, practitioners, educators, and the public alike—with a body of work that is at once captivating and controversial (for detailed reviews, see Matthews, Zeidner, & Roberts, 2007; Mayer, Roberts, & Barsade, 2008). Although there is no consensus among researchers regarding the exact definition and scope of EI, it is generally considered "a set of core competencies for identifying, processing, and managing emotion" (Matthews et al., 2007, p. 3). This paper tests the intriguing notion that the theoretically distinct capabilities within this broad set of core competencies may converge with each other.

Special issues of academic journals such as *Emotion, the Journal of Organizational Behavior*, and others have featured debates about whether EI is truly a matter of "intelligence." At the core of this debate is the question of whether EI is a novel construct that is worthy of serious academic attention, or whether it is simply a matter of repackaging old wine in new bottles. The definition of *intelligence* typically includes a person's ability to "deal effectively his [or her] environment" (Wechsler, 1944, p. 3), which is distinct from personality—that is, a preferred way of being that is neither right nor wrong. To argue that emotional functioning is not simply a matter of personal style but, instead, truly a matter of ability has become an important theoretical assertion in need of empirical data. Along these lines, in their review and critique of research on EI, Matthews, Zeidner, and Roberts (2002) outlined four empirical criteria that any purported measure should at least minimally satisfy: (a) content validity, (b) scale reliability, (c) construct validity, including convergent and divergent validity, and (d) predictive validity for relevant criteria. Matthews et al. (2002) argued that no test of EI to date has established evidence for all four.

This paper focuses on the second of these criteria—that is, the requirement for scale reliability which, in turn, requires also that the individual branches within EI must have at least moderate convergence with each other. This requirement is a tall order, with the umbrella concept of Emotional Intelligence encompassing concepts as theoretically distinct as recognizing other people's emotional expressions, expressing emotional cues clearly, understanding the relationships and transitions among emotions, using emotion to improve one's effectiveness, managing one's own emotional states, and influencing the emotional states of others.

The diversity of constructs within EI has made their convergence a challenging criterion. For self-reported EI, it is unsurprising that subjective perceptions tend to converge across distinct abilities. Self-report measures usually follow theoretical models of EI operating as a personality factor encompassing a variety of cognitive and non-cognitive abilities as well as generally adaptive characteristics (for a review, see Petrides, Furnham, & Mavroveli, 2007). Large-scale psychometric tests resulting from such models typically find these self-report EI tests are largely a matter of repackaging positively-valenced personality traits (Davies, Stankov, & Roberts, 1998)—even if not completely (Law, Wong, & Song, 2004). Self-reported EI is susceptible to the same bias and self-presentational concerns that affect self-reported measures in general (Funder, 1999), with the additional challenge of self-awareness regarding capabilities for

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which the environment typically does not give explicit feedback (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006). Accordingly, some theorists have concluded these self-reports are less a matter of ability than "emotional self-efficacy" (Tett, Fox, & Wang, 2005, p. 859)—which suggests self-reported emotional traits represent one's priorities, motivations, and hopes for emotional processes as much as skill per se. Further, artifacts such as common method bias can give the appearance of associations across EI factors. As such, it is difficult to use evidence from self-reported EI to document convergence across distinct domains.

The ability model has generally been accepted as the most scientifically well-validated approach to EI (Mayer et al., 2008; Roberts, Zeidner, & Matthews, 2001). Even so, for performance tests that measure actual ability, the convergence among components of EI has been elusive. Indeed, a sore thumb in this research literature has been the difficulty of demonstrating internal reliability for ability measures designed to cover the entire domain. The authors of such measures, notably the dominant MSCEIT test (Mayer, Salovey, Caruso, & Sitarenios, 2003), argue this problem results from non-convergence across the individual branches within EI—which is the topic of the current study—and conclude the EI domain encompasses such nonhomogeneous concepts tested using such heterogeneous methods that it is not even appropriate to report a coefficient alpha. Instead they report split-half reliability while allocating theoretically distinct constructs evenly across both halves.

We suggest it is worth taking another look at this question of convergence. Theoretical perspectives argue that any "intelligence" test should have objective standards for right answers. Overall tests like the MSCEIT rely instead on a consensus of test-takers and researchers for scoring purposes, which can introduce considerable bias (Barchard & Russell, 2006). Consistent with theoretical perspectives for intelligence, ability tests need objective standards for right answers. In relatively easy task domains, the vast majority can be expected to respond correctly (Mayer, Salovey, Caruso, & Sitarenios, 2001). However, in sufficiently difficult domains, the highest skill levels may be rare enough that some questions can be answered correctly only by a select few (Matthews et al., 2002).

Fortunately, measures with objective standards do exist for individual components within EI, and we argue such measures are ideal to addressing whether theoretically distinct constructs within EI converge. Notably, emotion recognition tests are validated with respect to the actual intentions of actors posing stimuli, and emotional expression tests are validated with respect to observers' actual comprehension of the intended message. Elfenbein and Eisenkraft's (2010) recent meta-analysis of these two ability-tested branches of EI documented positive convergence. In doing so, the authors solved a decades-old mystery in which previous results spanned literally from $r = -.80$ to $r = +.64$, on the basis of disentangling two moderating factors. In follow-up work using updated research methods, the convergence between emotion recognition and expression accuracy was substantial, $r = .43$ (Elfenbein et al., 2010).

Other theoretically distinct components of EI need to be subjected to the same kind of analysis. Recently, MacCann and Roberts (2008) developed a situational judgment test of emotional understanding—that is, "understanding the relations between, and transitions among, emotions and between emotions and circumstances" (p. 540)—in which participant responses are scored with respect to theoretical predictions based on the appraisal model of emotion (Ellsworth & Scherer, 2003; Frijda, 2007; Lazarus, 1991; Roseman, 2001). Appraisal theory is a longstanding and well validated model of the process by which we interpret—even minimally—the stimuli in our environment in order to guide emotional experience. According to appraisal theory, there are a small number of dimensions by which we judge a situation in order to yield a specific emotional state. For example, a negative event can elicit emotions as diverse as anger, fear, sadness, and guilt—depending on whom we judge responsible for causing the event. The specific predictions of appraisal theory have been validated extensively across a range of cultural groups (e.g., Scherer, 1997).

The current study examines the association of emotion recognition and emotional understanding. It is worth asking, on theoretical grounds, why should these two abilities interrelate? The most straightforward hypothesis is that there exists a larger-order intelligence domain for emotional functioning, and these two individual skills constitute part of this domain. Accordingly, a "positive manifold" is expected for associations among the individual components (Gutman & Levy, 1991; Roberts et al., 2001). Further, these two ability domains appear to share some of the same roots—where emotion understanding involves recognizing the underlying causes of emotions via attributes of the eliciting situation, and emotion recognition involves categorizing expressions in terms related to eliciting situations (Laukka & Elfenbein, in press; Scherer & Grandjean, 2008). Further, development across both domains benefits from effective parental socialization (Eisenberg, Cumberland, & Spinrad, 1998; Saarni, 1999) as well as personal motivation and attention (Tett et al., 2005).

If EI can truly be considered intelligence, then theoretically valid measures of these distinct aspects of emotional functioning should converge. Although this hypothesis is a matter of a simple zero-order correlation, it is a single correlation with far-reaching theoretical importance—and one that has been elusive in past empirical work that has searched for it vigorously.

2. Methods

2.1. Participants

University students in India ($N = 100$; 50% male; ages 19–38, $M = 25.5$, $SD = 4.7$) completed 1.5 hours of measures individually for compensation of 300 Rupees (US$6.73). Measures were administered in English, which is the language of university instruction and one of the national languages of India, and self-rated fluency was high ($M = 5.6$, $SD = 1.2$, Scales 1–7).

2.2. Measures

Vocal Emotion Recognition Accuracy (*VERA*; $\alpha = .70$). Stimuli were 96 representative items from the VENEC database (Laukka et al., 2010). Professional actors from India vocally expressed affection, anger, fear, happiness, lust, pride, sadness and shame—equal numbers of positive versus negative emotions, with both basic emotions and more nuanced social emotions. Actors were instructed to recall personal experiences and express emotions without overt stereotypes, recording weak and strong intensity levels to provide both easy and difficult stimulus items. Words alternated between two emotionally neutral phrases. Participants judged stimuli individually in randomized order, and could listen again if desired before choosing among the eight emotions tested. Scoring was dichotomous based on the actor's intended state (1 = match, 0 = otherwise).

Emotional Understanding (*EU*; $\alpha = .71$) was tested using the Situational Test of Emotional Understanding (STEU; MacCann & Roberts, 2008). The STEU contains 42 items describing situations, and for each item there are five emotions that the situation could elicit. Scoring was dichotomous based on appraisal theory predictions (1 = match, 0 = otherwise). Indian names were substituted for the Indian context.

Self-reported EI. For comparison, participants also completed the Self-rated Emotional Intelligence Scale (SREIS; Brackett et al., 2006;

Table 1
Emotion recognition and confusion percentages for judgments of emotion expressed via the voice.

Emotion portrayed	Emotion judgments							
	Affection	Anger	Fear	Happiness	Lust	Pride	Sadness	Shame
Affection	**34**	3	3	23	8	14	8	7
Anger	4	**71**	2	3	1	12	5	2
Fear	5	4	**57**	1	8	1	14	9
Happiness	15	2	2	**63**	3	11	3	2
Lust	13	2	11	1	**41**	6	17	8
Pride	16	20	1	12	5	**41**	3	3
Sad	5	0	18	1	2	3	**50**	21
Shame	8	2	14	2	8	4	26	**37**

Notes: Values in each row should sum to 100, except due to rounding. Bold typeface indicates the values in the diagonal cells, which represent the percentage accuracy for which the emotion portrayed is the same as the emotion judged.

α = .77), consisting of five subscales: Perceiving Emotions, Use of Emotion, Understanding Emotion, Managing Emotion, and Social Management.

3. Results

The confusion matrix in Table 1 contains conventional hit rates in diagonal entries. Overall recognition was 49%—optimal for assessing individual differences in ability without floor or ceiling effects. All emotions were recognized substantially better than chance guessing alone, and most misunderstandings took place within the same positive or negative valence.

In support of our hypothesis, ability-tested components of EI—in particular, VERA and EU—converged strongly, r = .53, p < .01, 95% CI .36 to .65 (see Table 2). Examining the correlations between EU and recognition of each of the eight individual emotions, each was positive, with 6 of 8 tests significant. Note the decreased reliability of using 12 items per emotion versus 96 items in total. For the two emotions not reaching statistical significance—affection and happiness—this appears to result from their frequent confusion with each other. When combining them into a single category in which participants received credit for either response, the correlation with STEU was r = .24, p = .02. In the case of the STEU, it was not possible to decompose the test into individual emotions, with only three items each.

In addition to the novel finding of convergence among ability-tested measures of EI, these data replicate the previously demonstrated convergence between self-reported perception and understanding of emotion, r = .34, p < .01. This correlation can reflect both a veridical association between the two abilities as well as common method bias and the confounding factor of self-efficacy regarding emotional domains (Tett et al., 2005).

In supplementary analyses—consistent with previous findings that there is moderate overlap between self-report and ability tests of EI (Brackett et al., 2006)—self-reported EU and ability-tested EU were correlated, r = .25, p = .01, 95% CI .05 to .42, but self-reported (SREIS Perceiving Emotion scale) and ability-tested emotion recognition (VERA) were not, r = .14, *ns*. Without reading too much into the difference in magnitude between these two correlations, we note that self-reported perceiving emotion is intended to include nonverbal cues beyond merely the voice. These two coefficients referred to the agreement between ability and self-report measures of the same construct within EI.

There appeared to be no systematic association between age and EI scores for these adult participants, regardless of whether measured via ability tests, VERA r = −.18, *ns*; EU, r = −.17, *ns*, or self-report measures, SREIS r = −.07, *ns*. There was no association between gender and performance in Emotion Recognition, r = .09, *ns*, Emotional Understanding, r = −.11, *ns*, or self-reported Emotional Intelligence, r = −.06.

Given that English is not the first language for these participants and yet this was the language in which they completed all measures, it was important to control for the level of English fluency. After all, one could find a spurious correlation among all measures if greater mastery in English allowed individuals to perform better, regardless of their underlying ability. Thus, we note that the association between EU and VERA was essentially unchanged controlling for English fluency, *partial* r = .48, p < .01.

4. Discussion

We tested and supported the notion that distinct emotional abilities converge. This convergence is implied by dominant theoretical models of EI (Matthews et al., 2002; Mayer et al., 2008), but little tested using ability measures that have objective standards to represent the underlying emotional capabilities. As such, this study provides new data to inform the often heated debate about the validity of EI—a research topic for which the available empirical data have not kept up with strong arguments.

We speculate that this relative dearth of empirical data results at least partly from challenges in measurement. The most commonly used assessments either rely on self-report or suffer from difficulty in establishing appropriate scoring systems. The newly developed STEU is a promising exception that was developed specifically to further research in EI. Additional progress could be made by borrowing more from research done not in the name of EI, but by psychologists studying the fundamentals of emotion itself. Laboratory protocols can test constructs such as regulating one's emotions and influencing the emotions of others—even though such protocols are often overlooked by researchers interested in measures that are highly scalable and commercially viable.

This manuscript focused on one of the four criteria outlined by Matthews et al. (2002) to demonstrate the validity of EI as a new and useful construct—namely the convergence of two among the many sub-constructs that have been hypothesized to form the EI domain, when using well-validated and theoretically grounded measures of these sub-constructs. Although it was outside of the scope of the present work to collect additional data to address the other three criteria, this pursuit remains a promising area for future research.

Ultimately, EI should be subjected to the same type of theoretical and empirical analysis as cognitive intelligence (Carroll, 1993). Future work can incorporate multiple measures to uncover EI's factorial structure, using samples large enough for sophisticated multi-level modeling techniques. The current finding that emotion recognition converges with emotional understanding—and, recently, that it converges with emotional expression accuracy—provide a basis of optimism that EI may truly be considered "intelligence." If so, this has broad implications for the areas of work life, social life, and educational life that the concept

Table 2
Associations among ability and self-reported measures of Emotional Intelligence ($N = 100$).

Variable	Scale	*M*	*SD*	Min	Max	1	1*a*	1*b*	1*c*	1*d*	1*e*	1*f*	1*g*	1*h*	2	3	3*a*	3*b*	3*c*	3*d*	3*e*	4*a*
1. VERA	0–96	47.42	6.72	25	64																	
1a. Affection	0–12	4.15	1.80	0	9	.45																
1b. Anger	0–12	8.53	1.32	5	11	.24	.00															
1c. Fear	0–12	6.91	1.92	1	12	.57	.15	−.04														
1d. Happiness	0–12	7.55	1.92	1	12	.43	.06	.01	.14													
1e. Lust	0–12	4.91	2.40	0	12	.52	.12	.09	.14	.06												
1f. Pride	0–12	4.93	2.16	0	10	.51	.15	−.03	.23	.16	.22											
1g. Sadness	0–12	5.95	2.04	0	11	.47	.07	.09	.27	.15	−.02	.09										
1h. Shame	0–12	4.49	2.16	0	10	.44	.15	.09	.19	−.05	.11	−.02	.11									
2. STEU	0–1	0.53	0.12	0.29	0.79	**.53**	**.10**	**.28**	**.29**	**.16**	**.31**	**.28**	**.30**	**.22**								
3. SREIS	1–5	3.54	0.47	2.32	4.53	.08	−.04	.26	.05	.01	.01	−.04	.06	.06	.20							
3a. Perceiving Emotion	1–5	3.88	0.60	2.50	5.00	.14	.05	.22	.12	.01	.06	−.05	.01	.15	.13	.68						
3b. Use of Emotion	1–5	3.45	0.87	1.00	5.00	.06	−.06	.17	.18	−.23	.05	−.03	.03	.16	.09	.26	.10					
3c. Understanding Emotions	1–5	3.14	0.85	1.25	5.00	.02	−.11	.22	.03	−.07	.05	−.04	.08	−.04	.25	.76	.34	.14				
3d. Managing Emotions-self	1–5	3.47	0.79	1.00	5.00	−.02	.04	.04	−.10	.14	−.13	.02	.04	−.06	−.02	.61	.30	−.24	.28			
3e. Social Management	1–5	3.75	0.71	1.50	5.00	.09	−.01	.16	−.01	.18	.03	−.03	.03	.03	.16	.76	.48	−.08	.47	.46		
4. Background variables																						
Age	–	25.5	4.7	19	38	−.18	.08	−.01	−.20	−.18	−.10	−.13	.00	−.09	−.17	−.07	−.13	−.12	−.05	.11	−.08	
Female	–	.50	–	–	–	.09	.05	−.12	.09	−.02	.08	.10	−.01	.08	−.11	−.06	−.05	.14	.03	−.21	−.09	−.11

Notes: Correlations $r \geqslant .20$, $p \leqslant .05$; $r \geqslant .25$, $p \leqslant .01$. VERA = Vocal Emotion Recognition Accuracy, $\alpha = .70$. STEU = Situational Test of Emotional Understanding, $\alpha = .70$. SREIS = Self-Rated Emotional Intelligence Scale, $\alpha = .77$. Bold typeface indicates convergence of ability measures of Emotional Intelligence.

touches. The current study provided as its core analysis a single zero-order correlation, but an elusive correlation with far-reaching theoretical importance. Rather than merely a matter of renaming existing constructs within psychology, EI holds the promise to represent a set of interrelated individual differences in the ability to deal effectively with one's emotional environment.

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References

Barchard, K. A., & Russell, J. A. (2006). Bias in consensus scoring, with examples from ability emotional intelligence tests. *Psicothema, 18*, 49–54.

Brackett, M. A., Rivers, S. E., Shiffman, S., Lerner, N., & Salovey, P. (2006). Relating emotional abilities to social functioning: A comparison of self-report and performance measures of emotional intelligence. *Journal of Personality and Social Psychology, 91*, 780–795.

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. New York: Cambridge University Press.

Davies, M., Stankov, L., & Roberts, R. D. (1998). Emotional intelligence: In search of an elusive construct. *Journal of Personality and Social Psychology, 75*, 989–1015.

Eisenberg, N., Cumberland, A., & Spinrad, T. L. (1998). Parental socialization of emotion. *Psychology Inquiry, 9*, 241–273.

Elfenbein, H. A., & Eisenkraft, N. (2010). The relationship between displaying and perceiving nonverbal cues of affect: A meta-analysis to solve an old mystery. *Journal of Personality and Social Psychology, 98*, 301–318.

Elfenbein, H. A., Foo, M. D., Mandal, M. K., Biswal, R., Eisenkraft, N., Lim, A., et al. (2010). Individual differences in expressing and perceiving nonverbal cues: New data on an old question. *Journal of Research in Personality, 44*, 199–206.

Ellsworth, P. C., & Scherer, K. R. (2003). Appraisal processes in emotion. In R. J. Davidson, H. Goldsmith, & K. R. Scherer (Eds.), *Handbook of the affective sciences* (pp. 572–595). New York and Oxford: Oxford University Press.

Frijda, N. H. (2007). *The laws of emotion*. Mahwah, NJ: Lawrence Erlbaum.

Funder, D. C. (1999). *Personality judgment: A realistic approach to person perception*. San Diego, CA, US: Academic Press.

Gutman, L., & Levy, S. (1991). Two structural laws for intelligence. *Intelligence, 15*, 79–103.

Laukka, P., & Elfenbein, H. A. (in press). Emotion appraisal dimensions can be inferred from vocal expressions. *Social Psychological and Personality Science*. doi:10.1177/1948550611428011.

Laukka, P., Elfenbein, H. A., Chui, W., Thingujam, N. S., Iraki, F. K., Rockstuhl, T., et al. (2010). Presenting the VENEC corpus: Development of a cross-cultural corpus of vocal emotion expressions and a novel method of annotating emotion appraisals. In L. Devillers, B. Schuller, R. Cowie, E. Douglas-Cowie, & A. Batliner (Eds.), *Proceedings of the LREC 2010 workshop on corpora for research on emotion and affect* (pp. 53–57). Paris: European Language Resources Association.

Law, K. S., Wong, C., & Song, L. J. (2004). The construct and criterion validity of emotional intelligence and its potential utility for management studies. *Journal of Applied Psychology, 89*, 483–496.

Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.

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

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

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

Mayer, J. D., Roberts, R., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology, 59*, 507–536.

Mayer, J. D., Salovey, P., Caruso, D. L., & Sitarenios, G. (2001). Emotional intelligence as a standard intelligence. *Emotion, 1*, 232–242.

Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion, 3*, 97–105.

Petrides, K. V., Furnham, A., & Mavroveli, S. (2007). Trait emotional intelligence: Moving forward in the field of EI. In G. Matthews, M. Zeidner, & R. Roberts (Eds.), *The science of emotional intelligence: Knowns and unknowns* (pp. 151–166). New York: Oxford University Press.

Roberts, R. D., Zeidner, M., & Matthews, G. (2001). Does emotional intelligence meet traditional standards for an intelligence? Some new data and conclusions. *Emotion, 1*, 196–231.

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

Saarni, C. (1999). *The development of emotional competence*. New York: Guilford Press.
Scherer, K. (1997). The role of culture in emotion-antecedent appraisal. *Journal of Personality and Social Psychology, 73*, 902–922.
Scherer, K. R., & Grandjean, D. (2008). Facial expressions allow inference of both emotions and their components. *Cognition and Emotion, 22*, 789–801.
Tett, R. P., Fox, K. E., & Wang, A. (2005). Development and validation of a self-report measure of emotional intelligence as a multidimensional trait domain. *Personality and Social Psychology Bulletin, 31*, 859–888.
Wechsler, D. (1944). *The measurement of adult intelligence* (3rd ed.). Baltimore: Williams and Wilkins.