

**Emotion Information Processing as a New Component of Emotional Intelligence:
Theoretical Framework and Empirical Evidence**

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Abstract

The relationship between emotional intelligence (EI) and emotion information processing (EIP) has received surprisingly little attention in the literature. The present research addresses these gaps in the literature by introducing a conceptualization of EI as composed of two distinct components: 1) EI_K or emotion Knowledge component, captured by current ability EI tests, related to top-down, higher order reasoning about emotions, and which depends more strongly on acquired and culture-bound knowledge about emotions; 2) EI_P or emotion information Processing component, measured with emotion information processing tasks, requires faster processing and is based on bottom-up attention-related responses to emotion information. In Study 1 (N = 349) we tested the factorial structure of this new EI_P component within the nomological network of intelligence and current ability EI. In Study 2 (N = 111) we tested the incremental validity of EI_P in predicting both overall performance and the charisma of a presenter while presenting in a stressful situation. Results support the importance of acknowledging the role of emotion information processing in the EI literature and point to the utility of introducing a new EI measure that would capture stable individual differences in how individuals process emotion information.

Keywords: Ability EI; Emotion-Information Processing; Emotional Intelligence; Performance; Stress.

Emotional intelligence (EI) celebrated its 30th anniversary in 2020. In three decades of research, EI has faced an astonishing development in research and applications: A Google Scholar search of contributions published on Emotional Intelligence between 1990 (the date of its introduction) and 2020 yielded 1,460,000 hits. Great progress has been made in the last few years to clarify some of the critical issues the construct was confronted with, such as its incremental validity, its relationship with intelligence and personality, and how to measure it as an ability or as a personality trait (MacCann et al., 2014; Mayer et al., 2016). Overall, EI has stood up to the scrutiny of scientific inquiry, although some scholars encourage the introduction of more sophisticated conceptualizations and measures of EI (Maul, 2012; Roberts et al., 2001; Sackett et al., 2017; Wilhelm, 2005).

The construct of Emotional Intelligence (EI) was introduced by Mayer and Salovey (1997) to describe four EI components or branches related to the recognition of emotions in oneself and others (emotion perception), the use of emotions to enhance thinking and behavior (emotion facilitation), the understanding of how emotions originate, develop, and change during emotional experience (emotion understanding), and the management of one's and others' emotions (emotion management).

EI can be investigated by applying two conceptually different approaches: the trait approach conceives EI as a dispositional tendency, like a personality trait, and measures the construct with self-report questionnaires; the ability approach conceptualizes EI as a capability supported by the processing of emotion information and assesses it with performance tests (Petrides & Furnham, 2001). The differences in the conceptualization and measurement of the two approaches are apparent by looking at the low correlation between trait and ability EI (Vesely Maillefer et al., 2018). Although some still dispute whether the two conceptualizations pertain to the same construct, this also being due to the different measurement approaches (Petrides, 2011), they often predict the same outcomes, although

through different paths (Udayar et al., 2020). The present research adopts the ability EI model as the theoretical framework.

In the last few years, there have been two important advancements in the domain of ability EI. First, the original Mayer and Salovey model of EI as composed of four interrelated branches underlying a latent EI factor has been reformulated. In fact, the emotion facilitation branch did not emerge as a separate factor (Fiori & Antonakis, 2011; Gignac, 2005; 2005; Roberts et al., 2001), leading scholars to adopt a 3-branch model of EI made of emotion recognition, emotion understanding, and emotion management (Elfenbein & MacCann, 2017; Joseph & Newman, 2010; McCann et al. 2014).

Another remarkable advancement has been the introduction of a second generation of ability EI tests. For years, the most widespread and basically only standardized test to measure EI as an ability was the Mayer Salovey Caruso Emotional Intelligence Test (or MSCEIT; Mayer et al., 2002). Research was at risk of mono-method bias; furthermore, the MSCEIT showed severe limitations in measuring EI as an ability, including poor utility in differentiating individuals scoring high from those scoring average (Fiori et al., 2014). There are now valid alternatives to measuring EI as an ability. For example, two of them are in the form of situational judgment tests that require reading short scenarios and a) understanding how the described individual would feel (Situational Test of Emotion Understanding, or STEU; McCann & Roberts, 2008) and b) identifying how the individual should behave in order to effectively manage emotions (Situational Test of Emotion Management or STEM; McCann & Roberts, 2008). Correct answers are scored with respect to theories of emotions (STEU) or according to the answers provided by a pool of emotion experts (STEM). Beyond the two new ability tests to measure emotion understanding and emotion management, the third EI branch of emotion recognition can be assessed with the Geneva Emotion Recognition Test, or GERT (Schlegel et al., 2014), which measures the ability to recognize emotions in

others with questions pertaining to short videos of actors expressing a wide range of emotions. Recently new tools that appear very promising have also been introduced to measure EI in the workplace, specifically (the Geneva Emotional Competence Test or GEC, Schlegel & Mortillaro, 2019).

Ability EI tests, including the second-generation tests, have shown low to moderate correlations with intelligence, a finding that overall supports the conceptualization of EI as a form of intelligence (e.g., Schlegel & Mortillaro, 2019). In addition, a seminal work on the relationship between intelligence and EI modelled EI and the three ability EI components of perception, understanding, and management of emotions as a second stratum factor of the Cattell-Horn-Carroll model of cognitive ability (MacCann et al., 2014). Although ability EI measures tend to show the strongest association with vocabulary and verbal reasoning tests (Farrelly & Austin, 2007; Roberts et al. 2006, Roberts et al., 2008), a recent meta-analysis found equal association between ability EI tests and the two components of intelligence, namely fluid and crystallized intelligence (Olderbak et al., 2018), the former being the capacity to reason about and solve new problems and the latter defined as the application of knowledge acquired through learning (Cattell, 1963). Furthermore, the association found between ability EI and intelligence was lower than expected ($\rho = .29$), with emotion understanding having the strongest association ($\rho = .43$) in comparison to the other branches, all showing much lower coefficients ($\rho = .19/.20$). Considering the rather weak association found between the ability EI branches and intelligence, the authors advocated for the introduction of new EI measures that would relate stronger to intelligence (Olderbak et al., 2018).

While we tend to consider medium-low associations of EI with intelligence as an asset, rather than a concern—as they would support the idea of EI as related to, but also different from standard intelligence — we share Olderbak and colleagues' (2018) suspicion

that current ability EI tests may not fully capture what EI is about. Following from this, we further explain the reasoning behind our discernment.

Why a New EI Component? Delving Into How Ability EI Is Currently Measured

In-depth analysis of the typical items employed to measure EI as an ability (such as the MSCEIT, the STEM and STEU) reveals that, in most cases, respondents are required to identify the best strategy one ‘should’ use in order to cope with emotionally loaded situations described in a short vignette, or to express their understanding of the emotion one would feel in these hypothetical scenarios. Individuals may correctly answer such items by relying on what they know about emotions. This begs the question as to whether they would be able to apply that knowledge in specific, real-life situations. All in all, it appears that the MSCEIT, the STEU and the STEM test how individuals would perform in hypothetical situations, rather than actual performance, the former being strongly dependent on the declarative knowledge individuals possess about emotions (Fiori, 2009). Individuals may be good at mindfully thinking and describing how they should behave theoretically, but not as good at actually engaging in the behavior required in real-life situations (Fiori, 2009).

Tests employed to measure emotion recognition do not rely on hypothetical scenarios, but are based on pictures or videos of people showing emotions. Although these tests require mostly the employment of perceptual skills--differently from the other EI tests—respondents may still identify the correct answer by relying on the knowledge they possess of how emotions are usually expressed.

Factual information people possess about emotions (or declarative emotion knowledge) is important, but also has limits. Two lines of reasoning support the limitations of current ability EI measures. First, we now know that ‘intelligent machines’ can fool humans: computers can simulate human behavior so realistically, including basic emotional reactions, that individuals interacting via messages with artificial intelligence may not realize the

exchange partner is not a human being (Turing test success, 2014). Dating back several years Ortony and colleagues (2007) had already made the case for why EI would need a fluid, experiential component, citing the case of ‘intelligent machines’, which, relying on algorithmic processes, would perform well on ability EI tests. However, intelligence machines cannot *feel* true emotions, at least, until proven otherwise.

The second, additional evidence comes from the observation of individuals with Asperger syndrome (now referred to as [high-functioning] Autism), a disorder characterized by difficulties in social interactions, lack of empathy, and atypical verbal and nonverbal communication. Such individuals may perform reasonably well on measures of emotion knowledge and emotional intelligence (Montgomery et al., 2010). However, when interacting in person with them, one quickly realizes that these individuals are lacking socio-emotional skills.

Emotion Information Processing as a New EI Component

If intelligent machines and individuals with Asperger syndrome may perform as well on ability EI tests as emotionally skilled individuals, then it seems as if we need an additional EI component that would measure factors associated with the emotional experience, such as the feelings and responses to emotions. We reason that the way individuals react and respond to emotions might depend on how individuals process emotion information, such as how they acquire (e.g., perceive and encode), pay attention to and ignore, retain, and retrieve emotion information (Fiori & Vesely Maillefer, 2019; Suedfeld & Tetlock, 1977).

Despite the definition of EI referring to the capacity “to carry out sophisticated information processing about emotions and emotion-relevant stimuli and to use this information as a guide to thinking and behavior” (Mayer et al., 2008), the association between EI and emotion information processing is an underdeveloped area of research (Fiori, 2009; Gutiérrez-Cobo et al., 2016; Mestre et al., 2016) Further, the few studies conducted present

rather unclear results. Austin (2004; 2005) found that inspection time of emotional stimuli and response speed when recognizing emotions aggregated into a latent factor distinct from inspection time based on the processing of neutral stimuli and the scores of trait EI (self-reports). Associations in the order of .21-.30 were found between emotion understanding and emotion perception tasks, but not between such tasks and emotion management (Austin, 2010). In another study, EI (as measured with the MSCEIT) did not even emerge as a predictor of performance on a task requiring participants to ignore distracting emotion information, differently from fluid intelligence and the personality trait of openness (Fiori & Antonakis, 2012).

A review article suggests that individuals with high EI, compared to those with low EI, tend to process emotion information more effectively (Gutiérrez-Cobo et al., 2016). These findings support the original definition and conceptualization of EI, although the authors based their conclusions on a small number of studies (e.g., 17), which were conducted with very different cognitive tasks. In addition, no effect size was reported for this association. The authors fostered a more fine-grained analysis of cognitive processes associated with EI. Given that emotion information processing appears to be part of the construct of EI, a better understanding of how EI is related to emotion information processing is needed.

In the current research we conceptualize emotion information processing as a new experiential EI component that would rely less on thoughtful reasoning than current ability EI measures (Fiori, 2009) and hence predict additional variability in emotionally intelligent behavior (Fiori & Vesely Maillefer, 2018). In principle, high-EI individuals should possess wider emotion knowledge, but also stronger abilities when processing emotional stimuli, both aspects accounting for how individuals perform in emotionally charged situations and each of them predicting distinct aspects of emotionally intelligent behavior.

The inclusion of a side of EI, currently not been accounted for in research and omitted in current testing, would allow us to fully acknowledge the role of EI in predicting various outcomes. The notion that ability EI predicts performance on top of IQ and personality has already been demonstrated in domains such as academic performance (Chew et al., 2013), performance under stress (Lyons & Schneider, 2005), and performance in the workplace (Brown et al., 2016; Joseph & Newman, 2010). And yet, in some cases its contribution appeared to be rather small (Joseph & Newman). We claim that the contribution of EI on top of IQ and personality would be higher if we were to include individual differences in processing emotion information. This EI component would account for more spontaneous, less thoughtful emotional behavior and performance (Fiori & Vesely Maillefer, 2018), and hence it would be distinct from traditional ability EI measures, while still being related to intelligence.

Emotion Information Processing and Attentional Processes

Because emotion information processing may involve an array of different cognitive functions, in this research we specifically address the category of *attentional processes*. First, selective attention is an aspect of intelligence (Dempster, 1991), especially fluid intelligence (Schweizer et al., 2005; Unsworth et al., 2010), and would therefore warrant a strict connection with the intelligence feature of EI. Second, attentional processes are a critical component of emotion regulation (Wadlinger & Isaacowitz, 2011). Emotion regulation falls within the realm of EI, and so should the basic mechanisms accounting for it.

Two basic attentional processes, namely *activation* and *inhibition*, were suggested to play a fundamental role in the experience of emotions. *Activation* ensures attention to goal-relevant information, whereas *inhibition* ensures that goal-irrelevant information will interfere with task execution (Lord & Levy, 1994). Individuals may engage in (e.g., activate) amusing activities with the purpose of improving their mood after a stressful day of work, or they may

intentionally avoid paying attention to (e.g., inhibit) upsetting information, or reduce the impact of very strong emotional reactions. Activation and inhibition go hand in hand, as activation by itself does not guarantee effective emotion regulation. Not only do individuals need to be able to boost emotional experience, but they also need to be able to inhibit or lessen inappropriate emotional reactions depending on the situation. Activation and inhibition within human functioning can be compared to the basics of driving a car: accelerating and braking, the two elementary functions allowing to operate a vehicle.

Activation and suppression of (in)appropriate or extremely intense emotions are fundamental skills to succeed in many activities. Influencing the motivational asset of the individual, emotions may strengthen or weaken efforts to reach a goal, and so do the basic mechanisms regulating such efforts. Furthermore, emotions impact the way individuals make decisions. For example, compared to individuals in a sad mood, those in a happy mood are more likely to make positive judgments (Gasper & Clore, 1998), or to use heuristics in problem solving (Gasper & Clore, 2002). Thus, the ability to attune or switch emotion according to the task at hand is a strong potential advantage, and may work at both conscious and nonconscious levels.

The literature on the association between EI and attentional processes is rather scant. Attentional processes may be measured with laboratory tasks, such as the Stroop task (Williams et al., 1996), the GonoGo task (Casey et al., 2001), or the dot-probe task (MacLeod et al., 1986), to cite a few. What these tasks share is the requirement to attend to relevant information, and discard or inhibit irrelevant, distracting information. Individuals who reported to have paid more attention to emotions, as measured by the attention scale of the Trait Meta Mood Scale (Salovey et al., 1995), took longer to name the color of positive and negative words in an emotional Stroop task, indicating stronger attention to such words (Coffey et al., 2003). Negative (low) associations were found between the Managing Emotion

branch of EI and an impulsivity index calculated from the scores of a numerical Stroop task, indicating that individuals high in Managing Emotion tend to be less impulsive (Checa & Fernández-Berrocal, 2015).

In addition, two studies employed emotion information processing tasks related to attention as core aspects of EI. The first employed an emotional variation of the classic Stroop task (1935) to identify a new aspect of EI called emotional attention regulation. This involves identifying emotion information while ignoring alternative distractors (tuning-in) and identifying alternative information while ignoring emotion information (tuning out). These two aspects predicted subjective well-being beyond personality and gender (Elfenbein et al., 2017). The second study employed a GoNoGo task to identify difficulties in maintaining focalized attention and difficulty to inhibit emotional responses. The former task predicted EI performance in a Theory of Mind task both individually and within an interaction with trait EI and ability EI (Vesely Maillefer et al., 2018). Although none of these studies formally tested the role of emotion information processing as a new EI component within the nomological network of intelligence and ability EI, they provide evidence that emotion information processing, in particular the type of processing related to attention to emotion information, may indeed constitute an additional component of EI.

The Present Research

In conceptualizing how this new EI component might relate to ability EI, we refer to the literature available (summarized earlier). As demonstrated, current ability EI tests do tap especially into the knowledge people possess regarding how emotions unfold, develop, and impact thinking and behavior. Emotion information processing tasks, however, rely on immediate and more intuitive reasoning about emotions and emotion information. We theorize two distinct components within a broad conceptualization of EI as a unique construct: one related to top-down, higher order reasoning about emotions, which depends

more strongly on acquired and culture-bound knowledge about emotions, hereby named *EI_K* or *emotion Knowledge component*; and another based on bottom-up attention-related responses to emotion information, which requires faster processing, named *EI_P* or *emotion information Processing component*.

Hypothesis 1: the EI construct can be conceptualized by having two distinct but related components: *EI_K* or the emotion Knowledge component, which is measured by current ability EI tests; and *EI_P* or the emotion information Processing component, which can be measured with tests tapping into attentional processes related to emotion information.

The hypothesized distinction between the *K* and *P* components of EI resembles another well-known difference, namely that between crystallized and fluid intelligence (Cattell, 1971). This distinction refers to the inborn (fluid) and acquired (crystallized) components of intelligence. More specifically, fluid intelligence concerns the perception of complex relationships among issues and the capacity to infer how they are related; in the words of Cattell, it represents the “...expression of the level of complexity of relationships which an individual can perceive and act upon when he does not have recourse to answers to such complex issues already stored in memory.” (Cattell, as cited in Kent, 2017). Crystallized intelligence refers to the knowledge of facts and procedures; according to Cattell it “...operates in areas where the judgments have been taught systematically or experienced before.” (Cattell, as cited in Kent, 2017).

Because of the similarities in the conceptualization of the *EI_K* and *EI_P* components of EI, with those of crystalized and fluid intelligence, we further elaborated that such new EI components would relate differentially to the two components of intelligence as theorized by Cattell. Although this is not in line with the results of the above-cited meta-analysis (Olderbak et al., 2018), showing that ability EI measures load equally and rather weakly onto crystallized and fluid intelligence, we thought that we could obtain partially different results

using the new generation of ability EI measures. Given that Olderback et al.'s (2018) results were contrary to their expectations, and also that most studies summarized in the meta-analysis employed the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT ; Mayer et al., 2003), which we know show certain limitations in the scoring system (Fiori et al., 2014), we acknowledge that all intelligence components should relate to both the K and P EI components and hypothesized that:

Hypothesis 2: EI_K should relate more strongly to crystallized than fluid intelligence; and

Hypothesis 3: EI_P should relate more strongly to fluid than crystallized intelligence.

The final part of our theorization concerns the validity of this new EI component, in particular its incremental validity with respect to ability EI, intelligence, and personality. We hypothesized that the EI variance explained by the EI_P component would be of a different type from that predicted by the EI_K component. Because the EI_K component involves deep reasoning about emotions and recalling of previous experience, this type of reasoning should predict more conscious and thoughtful behavior. In contrast, the EI_P component would be expected to predict more spontaneous and unplanned behavior (see also Fiori & Vesely Maillefer, 2018).

Hypothesis 4: EI_K will predict *performance that relies on deliberate thinking* – in addition to intelligence and personality.

Hypothesis 5: EI_P will predict *unplanned performance* - in addition to intelligence, personality, and the EI_K or the emotion Knowledge component.

Overview of Studies¹

¹ The data presented here are the main findings of a National Science Foundation project on the investigation of the cognitive and emotional bases of emotional intelligence, which has received research ethics approval from the authors' University ethics committee. An overview of the project can be found at the funding institution webpage: <http://p3.snf.ch/project-165605>. The research hypotheses were not formally pre-registered on a repository; hypotheses 1, 2, 3 were approved by the funding agency before conducting the studies (2016), hypothesis 4 and 5 were theorized in Fiori & Vesely-Maillefer (2018). The data of both studies and the syntax

The above-mentioned hypotheses were tested with two studies. Study 1 employed a multivariate correlational design in which different CFA models tested the hypothesized structure of EI against competing structures and its relationship with intelligence (Hypotheses 1-3). Study 2 employed an experimental design to compare the role of EI_P to that of EI_K, personality, and intelligence in predicting different types of performance under stress (Hypothesis 4-5).

The studies conducted have the following distinctive features: First, they involve second generation EI measures, in particular the Situational Test of Emotion Understanding (STEU) to measure Emotion Understanding; the Situational Test of Emotion Management (STEM) to measure Emotion Management, and the Geneva Emotion Recognition Test (GERT) to measure Emotion Recognition. Second, they include the new EI component EI_P emotion information processing, measured with emotional tasks that tap into attentional processes.

Study 1

Method

Participants

A priori calculations using Soper's (2019) SEM sample size calculator suggested that a sample size of 288 was recommended for the analysis to yield adequate power. This was based on a medium anticipated effect size (0.3), four latent variables, 10 observed variables, and a desired power level of 0.8 at a probability level of .05. Participants were recruited from several French-speaking universities, and included 349 undergraduate and graduate students (46.4 % female), with an age range from 17 to 48 (Mean = 21.37 and SD = 3.33). To participate in this study, proficiency in English was required as all the administered questionnaires, tests, and computer tasks were in English. The initial sample included 400

employed to analyze data can be found on the Open Science Framework:
https://osf.io/gxsk8/?view_only=20f730928ca34499b5167d62da01a417

students². We then employed a strict procedure to check for the quality of responses: 1) We removed 20 participants (5%) based on their self-reported low English level (control question); 2) We removed 30 more participants (7.5 %) because they filled out the online questionnaire in less than 30 minutes, which could be a sign of inattention and/or answering randomly. Finally, we also removed one more person whose scores on most of the measures were highly unlikely (such as the score of 1 on the emotion recognition test).

Procedure

All participants completed the emotional information-processing tasks, the intelligence batteries (all time-limited), and the personality questionnaires in a laboratory session that lasted 2 hours. All emotional intelligence tests were filled out during an online session, between one to seven days before. Participants gave written consent to participate in the study and received monetary compensation (60 CHF) for a full 3-hour session.

Measures

The full assessment battery was composed of ability emotional intelligence (AEI) tests, emotional information processing laboratory tasks, intelligence tests, and various other measures such as personality traits, trait emotional intelligence, emotion regulation, a working memory test, a mind-reading task and career-related outcomes that were collected for additional studies.

Ability emotional intelligence tests. Participants completed three AEI tests, the STEU, STEM, and GERT, each of them measuring three aspects of the predominant four-branch model (Mayer et al., 2008), namely emotion understanding, emotion management, and emotion recognition. We did not use the direct operationalization of this model, which is the Mayer-Salovey-Caruso Emotional Intelligence Test Battery (MSCEIT ; Mayer, Salovey,

² The data of the full sample as well as the statistical codes employed to analyze data can be found at: https://osf.io/gxsk8/?view_only=20f730928ca34499b5167d62da01a417. Results obtained with N = 400 and with the screened sample of N = 349 do not differ substantially.

Caruso, & Sitarenios, 2003) because of the methodological issues that have been raised with this instrument (e.g., Fiori et al., 2014).

1. STEU. The Situational Test of Emotional Understanding-Short Form (MacCann & Roberts, 2008) is a 25-item measure that tests the respondents' knowledge of the typical emotions felt by individuals in different situations. As a performance-based measure of EI, this test covers 14 emotions in total. Correct answers are scored based on Roseman's (2001) appraisal-based emotion model. An example of an item: "Xavier completes a difficult task on time and under budget. Xavier is most likely to feel? (Pride) The alpha level reported by the authors is .67 (MacCann & Roberts, 2008) and it was .56 in our sample.

2. STEM. The Situational Test of Emotion Management-Short Form (MacCann & Roberts, 2008) is a 20-item performance-based measure that tests the respondents' knowledge of how to manage emotions in a range of situations. Respondents are asked to select the one most effective way of managing the emotional situation, from a list of four described options. An example of an item: "Jacob is having a large family gathering to celebrate him moving into his new home. He wants the day to go smoothly and is a little nervous about it. What action would be the most effective for Jacob? (a) talk to friends or relatives to ease his worries; (b) try to calm down, perhaps go for a short walk or meditate; (c) prepare ahead of time so he has everything he needs available and (d) accept that things aren't going to be perfect but the family will understand. The alpha level reported by the authors is .83 (MacCann & Roberts, 2008) and it was .62 in our sample.

3. GERT. The Geneva Emotion Recognition Test short version (Schlegel et al., 2014) is a 42-item performance-based measure that tests the respondents' ability to recognize an emotion. It consists of short video clips with sound (1-3 seconds), in which ten professional actors (five males, five females) express 14 different emotions. Respondents are asked, after each video clip, to choose which of these emotions best describes the one expressed by the

person. Responses are scored into correct/incorrect format. The alpha level reported by the authors is .80 (Schlegel & Scherer, 2015).

Emotion information processing tasks. Two tasks tested emotion information processing, namely the emotional Stroop task and the Emotional Go/NoGo task. These tasks can be scored according to accuracy in responding or speed of response (RT) in providing an answer. We employed accuracy in response, operationalized as the percentage of error in each task³. E-Prime 2.0 (Psychology Software Tolls, Pittsburgh, PA), a software tool for behavioural research, was used to design these computerized tasks and collect the data.

1. Emotional Stroop Task. In a typical Stroop task (Stroop, 1935) individuals are required to name the color of the font with which a word is written, such as BLUE written in red font. Because the meaning of the word conflicts with the color of the font, this creates an interference that requires participants to ignore reading the word and forces them to pay attention to the color instead. The Emotional Stroop task (Williams et al., 1996) is a variation of the original task in which participants are still required to identify the color of the font with which a certain word is written, but in this case the interference is created by the valence of the word (either positive or negative; neutral words were included for comparative purposes). Individuals who are able to inhibit emotional interference (e.g., attention to the valence of the word) respond faster and more accurately. This task was taken as a measure of allocation of attention (Lamers et al., 2010). E-prime was used to present stimulus words one at a time on the computer screen in one of four colours: pink, red, green, and blue on a white background. Participants were required to indicate the color of words, regardless of the word content. There were, in total, 25 positive words, 25 negative words, and 25 neutral words. Scores on the Stroop task can be calculated according to error rates or calculating reaction time differences between congruent and incongruent trials (MacLeod, 1991). We employed the

³ Results of the Factor Analyses do not differ significantly when using reaction time as compared to accuracy of response.

former option and calculated the error rate for negative and positive words for each participant—indicating stronger overall emotional interference-- which was retained as the indicator of a subcomponent of EI_p.

2. Emotional Go/NoGo task (GoNoGo). The Emotional Go/NoGo task (Hare et al., 2005) is a modified version of the Probability Go/NoGo task (Casey et al., 2001). It is used to examine the role of cognitive control processes in emotional information processing. This task requires to respond as fast as possible to emotional cues, such as faces expressing certain emotions, which corresponds to a given criterion, such as the expression of happiness. The condition of having to respond to faces matching the given criterion, or 'go' trials, are interspersed with trials—the NoGo trials--in which individuals have to abstain to provide an answer because the stimuli do not correspond to the given criterion. For example, not responding to neutral face when the criterion is to respond to a happy face. The task yields 4 types of answers: response to the Go trials (correct response or True Positive, TP), no response to the Go trials (incorrect response or False Positive, FP), no response to the NoGo trial (correct response or True Negative, TN) and response to the NoGo trials (incorrect response or False Negative, FN). We used the protocol employed in previous studies (e.g., Tottenham et al., 2011) characterized by the prevalence of Go trials (70%) over NoGo trials (30%). More specifically, neutral faces were always interspersed with emotional faces expressing one of 4 emotions: happiness, fear, anger, and sadness. The task started with 12 practice trials followed by 8 blocks of 30 trials each in which the same emotional pair (e.g., happy-neutral) was alternated in three cycles of 10 trial each in which there was a percentage of Go trials of either 100%, 70% or 30%. There were 240 trials overall. The stimulus duration was 500 ms with 1000 ms between trials. We recorded the overall number of correct hits and errors to the Go and NoGo trials; furthermore, we factor analyzed the 4 types of responses and identified 2 main latent factors accounting for 97.4% of the scores, which

indicated *difficulties* in maintaining focalized attention (Go/NoGo_Activation), and *difficulties* to inhibit emotional responses (Go/NoGo_Inhibition). Out of the four types of responses, we retained the regression scores of these two latent factors as the performance indicators of the Go/NoGo task.

Cognitive Performance tests. Four cognitive performance tests were included in the test battery, in order to have two markers for both respectively fluid and crystallized intelligence. All of these tests were timed, with the computerized tasks timing out after the indicated time limit.

1. Raven's Standard Progressive Matrices (RPM). The Raven's Standard Progressive Matrices (Raven, 1941) assess cognitive abilities, especially fluid intelligence. The test is composed of five sets of 12 multiple-choice, progressively more difficult items (60 items total). The test was time-limited to twenty minutes. The alpha level of the total score in the current sample was .86.

2. Concept formation WJ-III (ConForm). The Concept Formation from the Woodcock-Johnson III Tests of Cognitive Abilities (Woodcock et al., 1989, 2007) was used to assess fluid intelligence. It is a measure of inductive logic which requires rule application and flexibility in thinking. Respondents were presented with a complete stimulus set from which to derive the rule for each item. The test, composed of 35 problems, was time limited to 20 minutes and the Cronbach reliability of the total score in the current sample was .87.

3. Vocabulary test (Voc). The Vocabulary test from the Kit of Factor-Referenced Cognitive Tests (Ekstrom et al., 1976) was used to assess crystallized intelligence via knowledge of word meanings. Respondents indicated the correct meaning of a target word from a list of four words. The test, composed by 18 items, was time limited to eight minutes. Reliability for this sample was .53.

4. Verbal reasoning test (VR). The Verbal Reasoning test from the Kit of Factor-Referenced Cognitive Tests (Ekstrom et al., 1976) was used to assess crystallized intelligence. Respondents reasoned with both visual and verbal information to draw inferences regarding relationships. They had eight minutes to solve thirty problems. Reliability for this sample was .64.

Statistical Analysis

Descriptive statistics and correlations were calculated including means, standard deviations, and Pearson correlations. To test hypotheses, confirmatory factor analysis (CFA) was conducted using package *lavaan* in R with maximum likelihood estimation. The following fit indices were primarily considered: The comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the AIC. Chi-square test statistic (χ^2) is reported too, but because it is affected by sample size, it is only considered an additional index. A model is considered to have a very good fit if the CFI value is .90 or above, the TLI values are above .95 and the RMSEA and SRMR value is .08 or less (Cheung & Rensvold, 2002). For model comparison, we consider differences in the AIC (the lowest is the best) as our models are not nested models and thus chi-square difference test is not appropriate.

We tested two structural models of EI and three structural models of EI and intelligence (g), all illustrated in Figure 1. To test Hypothesis 1 regarding the distinction between the K and P components of EI, a unidimensional model of EI where all ability EI measures and emotion information processing tasks load onto one EI factor (Model 1) was compared to a two-factor model of EI where all ability EI measures load onto EI_K factor and all emotion information processing tasks load onto EI_P factor (Model 2). To test Hypotheses 2 and 3 concerning the association of the K and P components of EI with the fluid and crystallized components of intelligence (g), a unidimensional model of EI and intelligence

where all the EI measures and g measures load onto one g factor (Model 3) was compared first to a two-factor model where the EI measures load onto an EI factor and g measures onto a g factor (Model 4), and then to an oblique 4-factor model (Model 5) where ability EI measures load into a EI_K factor, emotion information processing tasks onto a EI_P factor, tests evaluating the crystallized part of intelligence onto a Gc factor, and tests evaluating the fluid part of intelligence onto a Gf factor.

Results

Descriptive Statistics and Correlations between Variables

Mean, standard deviation, and Pearson correlations for all measures are shown in Table 1. Correlations among ability EI measures ranged from .26 to .39. All ability EI measures correlate significantly to EI_P tasks, except emotion recognition and difficulties to inhibit responses. EI measures were all correlated significantly to Gf and Gc measures. Correlations among EI_P tasks were either non-significant or rather low. Emotional Stroop task was correlated to Raven and verbal reasoning. Difficulty to inhibit was significantly correlated to verbal reasoning and concept formation, and difficulty to activate was significantly correlated to all 4 intelligence tests. Age was not correlated to any of the variables and sex was only correlated to EI measures.

Before testing hypotheses, preliminary analyses were conducted on the emotion information processing tasks. Regarding the emotional Stroop task, error rate for negative, positive, and neutral words did not differ from each other. Concerning the emotional GoNoGo task, the percentage of correct answers to the go trials (True Positive) was 85.8%, the percentage of error in the go trials (False Positive) was 13.92%, the percentage of correct answers to the NoGo trials (True Negative) was 82.57%, and the percentage of error in the NoGo trial (False Negative) was 17.39%. Hence the most difficult condition was the one in which participants had to abstain from providing an answer.

Structural Models of EI (Hypothesis 1)

All variables' scores were standardized before conducting analyses. We retained the data of only those participants with the full set of data, or 310 participants. We first described and compared the two structural models of EI subtests alone. Fit indices for these models are shown in Table 2 and parameter estimates in Table 3. Before discussing fit indices for these models, we note that the models in Figure 1 are not nested models, thus the chi-square difference test is not appropriate. Instead, to evaluate models we consider 1) differences in the AIC and 2) factor loadings.

As shown in Table 2, neither the unidimensional model nor the two-factor model of EI showed good fit, especially for CFI and TLI. Both models showed similar AIC. However, factor loadings (see Table 3) of the two-factor model of EI were better than the factor loadings of the unidimensional model, mainly those of the emotion information processing component (EI_P). Hence, we decided to move forward with the two-factor model. To improve the latter, we inspected modification indexes and noticed that the GoNoGo_Inh (Difficulties to inhibit) and the GoNoGo_Act (Difficulties to activate) were indeed correlated. Hence, we let the error terms of GoNoGo_Inh and GoNoGo_Act to covariate. The model improved greatly: chi-square is no longer significant. The covariance of the two-factor, EI_K and EI_P , was $-.62$ ($z = -2.91, p = .004$) in the final model. Overall, the adjusted Model 2 shows acceptable fit indexes, supporting Hypothesis 1 that EI can be conceptualized as having both the EI_K and EI_P components, the former measured with current ability EI tests and the latter with emotion information processing tasks that tap into attentional processes.

Fit indices for the models of EI and Intelligence (g) are shown in Table 2 and parameter estimates in Table 4. The unidimensional model of ability emotional intelligence, emotion information processing, and cognitive performance tests together loading into one general factor did not show a very good fit overall. The two-factor model, separating emotional

intelligence from general intelligence, fit the data slightly better than the unidimensional model. The factor loadings of *g* were acceptable to good (from .38 to .79), but only ability emotional intelligence tests' factor loadings were good (from .46 to .59). The factor loadings of emotion information processing were low although significant (from -.24 to -.38). The covariance of the two-factor, EI and G, was .70 ($z = 5.50, p < .001$).

The last model, the oblique 4-factor model with two lower order factors of EI (EI_K and EI_P) and two lower order factors of G (crystallized and fluid) fit the data better than both the unidimensional and two-factor models. The model showed acceptable fit, except for TLI. It also showed the lowest value of AIC, confirming that it is the best model. To further improve this model, we added a covariance between the error terms of Difficulties to inhibit (GoNoGo_Inh) and Difficulties to activate (GoNoGo_Act) as we previously did for the two-factor model of EI. This new oblique 4-factor model showed a very good fit and TLI value improved significantly. It also showed the best factor loadings compared to all other models, especially those of the emotion information processing tasks (from .39 to .54).

Generally, the covariances among the four factors were strong and significant (from -.42 to .81). As shown in Table 4, covariance between the two lower factors of G ($r = .81$) was the highest, followed by the covariance between EI_K and G_c ($r = .75$), and between the two lower factors of EI ($r = -.64$). The covariance between EI_K and G_c was significantly higher than the one between EI_K and G_f ($z = 10.50, p < .001$). Hence, Hypothesis 2 was confirmed. Unexpectedly, the covariance between EI_P and crystallized component of G ($r = -.48$) was slightly higher than the covariance between EI_P and the fluid component of G ($r = -.42$). However, this difference is only marginally significant ($z = -1.94, p = 0.05$). Therefore Hypothesis 3 was not supported.

Discussion

This study introduced a new EI component, EI_P, representative of the emotion-information processing of EI. It then compared different models conceptualizing the relationship between this new component, with traditional ability EI measures and intelligence measures. Results showed that the best fitting model is one where EI_K and EI_P relate to both Gc and Gf, as hypothesized.

More surprising was the result that EI_P was as related to Gc as to Gf, contrary to our expectations⁴. We believe that this finding could be related to the fact that the Verbal Reasoning test employed in the study was supposed to be a measure of crystallized intelligence, when, in fact, it was also correlated with fluid intelligence. Theoretically, this is coherent as understanding the relationships between words/concepts requires the knowledge (crystallized) of those words, but also the ability to problem solve the similarities between those words/concepts in a novel way, separate from their definitions. Thus, the Gc factor identified in our study might capture fluid, in addition to crystallized intelligence. Another potential explanation is that emotion-information processing may involve not only fluid reasoning about emotions, which relies on episodic memory, but also knowledge-related understanding, which depends on semantic memory. Hence, although the two components can still be distinguished from each other, they may have more aspects in common than expected. Overall, our results support the introduction of a new EI_P component related to how individuals process emotion-information. The proposed overall EI model was supported when including this EI_P component alongside ability EI (EI_K) and in relation to both fluid and crystallized intelligence.

Study 2

In study 2 we aimed to test the incremental validity of the new EI_P component by investigating whether it would predict performance in a stressful situation on top of ability EI tests, personality, and intelligence. We chose a task characterized by high emotional

⁴ A reviewer asked to conduct an exploratory factor analysis. The results of the analysis can be found at https://osf.io/gxsk8/?view_only=20f730928ca34499b5167d62da01a417.

involvement as the role of EI should especially impact in this type of circumstance, in comparison to other individual differences known to be strong predictors of performance (e.g., intelligence). Due to the level of stress that was generated in the study, we hypothesized (Hypothesis 4) that overall performance would require the full employment of emotion-knowledge and reasoning (e.g., EI_K) plus the ability to process emotion information relevant to the situation, such as that of threatening stimuli (e.g., EI_P). In addition, we hypothesized that EI_P would account for additional variance on top of EI_K, personality, and intelligence for the aspect of performance that is more spontaneous and unplanned such as, in the present study, charisma (described below) (Hypothesis 5). It is recognized that, theoretically, both aspects should play a role in the outcome/behavior.

The task involved delivering a 3-minute presentation on a difficult topic in front of a camera and two neutral evaluators. We employed the dot-probe task to measure the EI_P component.

In the context of the type of performance employed in this study, thoughtful performance (hereafter named overall performance) was operationalized as the extent to which participants met the criteria of clarity, organization, and coherence in presenting the argument given. Unplanned performance (hereafter named charismatic performance) was operationalized as the charisma with which participants presented, a characteristic that, although may improve with training (e.g., Antonakis et al., 2011), relies heavily on individual differences (Antonakis, 2011) and innate (or early developed) qualities, especially in the context of the current task, which did not allow for extensive preparation.

Method

Participants

A priori calculations using Soper's (2019) sample size calculator for hierarchical multiple regression suggested that a sample size of 94 was recommended for the analysis to

yield adequate power. This was based on a medium anticipated effect size (0.15), 10 predictors in the first block (set A), 4 additional predictors in the following block (set B), and a desired power level of 0.8 at a probability level of .05. Participants originally included 124 students⁵, of which only 111 (51 female) were retained (4 were removed due to lack of compliance with instructions and 9 because they filled out the online questionnaire from study 1 in under 30 minutes, utilized here as a sign of inattention and/or answering randomly). Participants were drawn from the 400 that participated to Study 1 a year before. They gave written consent to participate in the second study, which was 45 minutes long, and were compensated 20 XX (removed for blind review) for their participation.

Procedure

A lab with computer desks in separate cubicles lining parallel walls of the room and served to run the experiment. The space in the middle was used for the presentation. All instructions were written and given to the participants with the stated option to ask questions before each phase. Upon arrival in the lab, participants were first escorted to a cubicle and completed a questionnaire regarding their current emotional state. Recall that the measures of ability EI and cognitive ability tests, a personality inventory, and a series of demographic questions had already been collected a year prior for Study 1. Participants were then instructed to prepare a 3-minute oral presentation within 10 minutes, performed immediately following their preparation. The content of the presentation was revealed at this time and differed by experimental group. Participants were either randomly allocated to a high stress condition (N = 55, 24 females), which required the synthesis of a complex philosophical text, or to a low stress condition (N = 56, 27 females), which involved discussing one's professional experiences and career aspirations. This occurred while being filmed (with a

⁵ The data of the full sample, the data of the screened sample and the statistical codes employed for analyzing the data can be found at: https://osf.io/gxsk8/?view_only=20f730928ca34499b5167d62da01a417. Results obtained with N = 124 and with the screened sample of N = 111 do not differ substantially.

visible video camera) and in front of two *neutral* evaluators (trained how to respond to participants' questions and how to remain neutral). To further manipulate stress in the first group, the instructions accentuated that the aim of the presentation was to assess participants' intelligence and emphasized that all performances would be video recorded.

After the 10-minute preparation and just before presenting, participants completed the emotion information processing task on the computer. They were then invited to stand on a sign marked on the lab floor in order to deliver their talk. In the two conditions, participants had to speak until the end of the 3 minutes. If they stopped earlier, they were prompted to continue. The evaluators were seated behind a desk as they listened and rated each presentation independently using an online assessment form (created by the experimenters – evaluators were trained on how to use the questionnaire). Finally, participants completed a short post-presentation questionnaire before being debriefed. In total, the experiment lasted about 45 minutes.

Measures

The verbal reasoning test (VR), the fluid intelligence test (RPM), the personality questionnaire, and all the ability emotional intelligence tests (STEU, STEM, GERT) were administered for Study 1 (T1); an emotion information processing task, and a presentation assessing overall performance and charismatic performance were introduced for this second study (T2). Sex and experimental condition were added as control variables.

Brief HEXACO Inventory . This is a 24-item questionnaire that assesses six personality dimensions: Honesty, emotionality, extraversion, agreeableness, conscientiousness, and openness (De Vries, 2013). Participants were asked to respond to items at T1 using a Likert scale ranging from 1= strongly disagree to 5 = strongly agree. Alpha reliabilities of the dimensions in the brief version of the questionnaire range from .43 and .72 (De Vries, 2013) and from .39 to .69 in our larger sample.

EIP: Attentional task. We employed a version of the dot-probe task (MacLeod, Mathews, & Tata, 1986) as a widely used measure of selective attention in the literature and previously used as a measure of attention bias (Iacovello et al., 2014). The task involves 160 trials in which a fixation cross is presented in the center of the screen (duration 500ms) followed by two words with emotional (in particular, threat-related) and neutral valence presented one above the other (duration 500 ms). Then a dot appears in the location of one of the two words, and participants are asked to indicate the location of the dot by pressing one of two keys on the keyboard. Faster reaction times (RTs) to dots replacing a threat-related word indicate higher attention to the emotional stimulus. We retained RTs to threatening stimuli as a measure of emotion-information processing (EIP).

Overall Presentation Performance. Overall quality of the presentation (Performance-O) was assessed by a single-item evaluating the overall presentation of the participant (1-extremely bad, 5-extremely good). The two evaluators rated each individual's presentation overall based on the following criteria: clarity, organization, and coherence of the argument presented; furthermore, participants were asked to mention some examples and present their personal opinion of the topic, which also contributed to the overall evaluation of performance. The inter-rater reliability using the intra-class correlation coefficient (ICC) was .91, indicating very high agreement between the two raters.

Charismatic Performance. An 8-item scale composed of adjectives related to charismatic personality was used to assess charismatic performance (Performance-C). The evaluators had to rate the presenter during the presentation on 8 adjectives (1 = not at all to 10 = extremely): captivating, charismatic, convincing, engaging, magnetic, competent, attractive, and seductive. These adjectives were identified by checking synonyms of the word 'charismatic' provided by the English dictionary Merriam-Webster. The raters did not agree very much on the ratings of 'seductive'--the intra-class correlation coefficient (ICC) was $r =$

.36. Therefore, we removed this adjective from the scale. A confirmatory factor analysis was conducted to validate the structural model. The unidimensional model (all the adjectives, excluding seductive, loading into one charismatic performance factor) showed a good fit after adding some covariations between error terms. Loadings were all above 0.8, except for attractive (.55). Cronbach alpha coefficient was .96.

Statistical Analysis

This experimental study included two conditions. Separate analyses for both conditions were not run for the following reasons: 1) In both conditions, participants experienced stress, although one condition was more stressful than the other. 2) Overall performance was measured by the same 1-item scale and was based on the same evaluation criteria.

Descriptive statistics and correlations were calculated including means, standard deviations, and Pearson Correlations. Regarding the emotion-information processing task (dot-probe), the percentage of error was 9.5%. We removed RTs shorter than 2 SD from the mean, which represented outliers (2% of the total trials). We employed hierarchical regression analysis using the software STATA (StataCorp, 2019) to test incremental variance accounted for by emotion information processing in overall performance and charismatic performance. For the two regressions, in the first block, performance was regressed on sex, intelligence, experimental condition, English level, and personality traits. In the second step, we added the three ability emotional intelligence tests, and in the last step, we added the emotion information processing task.

Results

Table 5 shows Pearson correlations for all the study variables. Overall performance and charismatic performance were significantly correlated to the experimental condition, STEU, and the attentional task. This task was significantly correlated to emotionality and

STEU. All the ability emotional intelligence tests were significantly correlated to verbal reasoning.

We ran two separate hierarchical models with robust standard errors: one for overall performance (Table 6a) and one for charismatic performance (Table 6b). We reported all the beta coefficients, confidence intervals, the increments in R^2 , and whether this was statistically significant. Regarding overall performance, among the individual differences included as controls, English level, experimental condition, and openness showed a statistically significant regression coefficient. Ability emotional intelligence measures, or the EI_K component and in particular Emotion Understanding, was a significant predictor ($\beta = 0.23$, $p = 0.007$). This EI_K component showed additional variance with respect to the control variables, $\Delta R^2 = .035$, $p = .058$. We noticed that the additional variance explained was marginally significant⁶. Because our sample was reduced by the screening of participants, and the number of predictors (14) was rather high for our sample size ($N = 99$) we conducted an additional parsimonious regression in which we entered only the predictors that were significant in the full model, in order to increase the degrees of freedom. This model (Table 7) showed that Emotional Understanding was still a significant predictor in block 2, and that it added significant variance on top of intelligence, personality and the control variables, $\Delta R^2 = .037$, $p = .004$. These results support Hypothesis 4.

Regarding charismatic performance, English level and experimental condition were significant predictors in block 1. Nor Emotion Understanding nor the other EI_K components were significant predictors in block 2. The attentional task was a significant predictor of charismatic performance in block 3 ($\beta = -0.23$, $p = 0.002$), and it added additional variance beyond personality, intelligence, and EI_K ($\Delta R^2 = .045$, $p = .007$). Hence, hypothesis 5 was supported. We notice that the attentional task explained additional variance in both overall

⁶ The analysis conducted with the full sample of 124 participants yielded a fully significant ΔR^2 .

and charismatic performance, with the increased variance being larger for the latter ($\Delta R^2 = .045, p = .007$) than for the former ($\Delta R^2 = .024, p = .002$).

Study 2 Discussion

The aim of Study 2 was to test whether the emotion-information processing component (EI_P) of EI would predict emotional laden performance, and additional variance on top of the emotion knowledge component (EI_K), personality, and intelligence on a task characterized by high emotional involvement. We investigated two performance indicators: overall performance and charismatic performance. Results showed that EI_K significantly contributed to overall performance on top of intelligence and personality, and EI_P to charismatic performance on top of intelligence, personality, and EI_K .

As an expansion to previous research, we show that the subcomponents, EI_K and EI_P , contributed significantly to different types of performance. The contribution of EI_K was significant for overall performance and the contribution of EI_P was stronger for charismatic performance, as originally hypothesized. Although the amount of explained variance added by the two EI components was not particularly notable, it remains a significant addition to overall variance. Of note, EI_P contributed with additional variance on top of that accounted for by EI_K for *both* outcomes.

Results suggest that in order to deliver an effective presentation under stress, participants were able to draw upon a strong understanding of emotions, which helped them to better manage the challenging task. Individuals who were faster at processing contextualized emotion information (in this case, those who perceived the stressful nature of the situation more promptly (e.g., they provided faster reactions to threat-related stimuli), delivered a better overall performance and a more charismatic one. Our results show that individuals high in EI_P were better able to correctly categorize an emotional situation as a potential threat. In addition, they provide further support to findings indicating that coping

effectively with stressful situations entails faster activation of threat-related stimuli, which helps the organism to respond quickly to danger (see also Mikolajczak et al. 2009).

It has always been said that charismatic individuals communicate emotions in a very effective way. Our results suggest that a more thorough processing of contextual emotion information may facilitate the manifestation of charisma. It appears that a quicker identification of cues indicating threat in a stressful situation indicated more accurate apperception of the difficulty of the situation, which helped to fully mobilize the resources needed to perform optimally on the task, including those related to the natural talent of participants (=charisma).

In choosing the two outcomes of performance, we identified one type that relies more on thoughtful presentation of the topic and its organization within the given time (overall performance). The other depends more on presentation style, rather than content, as well as on the ability of the speaker to convince and engage the audience (charismatic performance). Whereas the former relies more on deliberate behavior, the latter type of performance is less prone to previous preparation—especially within the allotted 10 minutes—and may depend on the ease with which participants were able to convince *on the spot*. In line with our hypotheses, we found that more thoughtful performance was predicted by knowledge about emotions and emotion behavior (EI_K), and that more unplanned performance was predicted by the ability to process contextual emotion information (EI_P).

Our results are aligned with previous findings showing that when asked to introduce themselves in front of a large audience, with preparation time, individuals high in EI, in particular Emotion Understanding, were evaluated to be more effective than individuals low in emotion understanding. The same individuals, however, were not perceived to possess higher leadership skills when presenting (Fiori, 2015). In the current study, which included the new EI_P component, we found that each of overall performance and charismatic

performance were predicted by attention to contextualized emotional stimuli. Despite the two outcomes variables being highly correlated with one other, a distinct contribution of the predictors for each outcome was identified, with EI_K predicting overall performance and EI_P predicting charismatic performance. Importantly, the EI_P component showed *incremental* validity for both outcomes of this study, and specifically for unplanned behavior, supporting the advantages strong apperception of emotion information may have in emotionally laden situations as well as its utility as a novel predictor of emotionally laden performance.

General Discussion

To date, the association between emotion information processing and EI has received little attention in the literature. EI has been defined as the capacity “to carry out sophisticated information processing about emotions and emotion-relevant stimuli and to use this information as a guide to thinking and behavior” (Mayer et al., 2008). And yet, evidence regarding the association between EI and emotion information processing is rather scant and inconsistent. Furthermore, no theoretical explanation has been provided to address how EI and emotion information processing could be related. The present research fills these gaps in the literature by conceptualizing emotion information processing as a new component of EI that should be added to current EI conceptualizations and related to the different components of intelligence. Study 1 supports the identification of the new emotion-information processing component of EI (EI_P) within current ability EI tests (EI_K) and the intelligence nomological network. In Study 2 we provide evidence that this new component predicts performance-related outcomes beyond ability EI tests, personality, and intelligence. Overall results support the appropriateness of our conceptualization and its utility in predicting performance in an emotionally charged situation.

Implications for basic and applied research

Our findings suggest that current research may have been missing variability in emotionally intelligent behavior due to an EI component that has been omitted from current theorization and measurement. Evidence that EI plays a role in predicting work-related outcomes on top of intelligence and personality already exists (Joseph & Newman, 2010). This being said, depending on the outcome, the contribution of ability EI emerged as rather small. The addition of the EI_P component may reveal EI as having a stronger role in predicting emotional laden workplace behavior.

It is important to note that, despite having discussed the need for the development of new tests tapping into the EI_P component throughout our research contribution, the main purpose of the current research was to conceptualize the existence of this component and to show its utility, not to introduce a new *measure* of EI based on emotion information processing tasks. Although we employed emotion information processing tasks in both Study 1 and Study 2, such tasks were not meant to introduce new EI_P tests capturing stable individual differences. Though the difference may seem subtle at first sight, it is instead quite substantial. The challenge of employing experimental tasks taken from the emotion and cognition literature to the study of individual differences resides in the opposite requirements they rely on: Experimental tasks in which different conditions are manipulated (e.g., emotional and neutral words) work better when between subject variability is minimized, given the interest in finding differences between experimental conditions; hence, the more similar individuals are, the better the experimental paradigm is. The assumptions of correlational research—those traditionally employed for studying individual differences—are different. In this research approach the purpose is to find large variability among subjects in order to consistently rank them based on their differences concerning the characteristic analyzed (for an excellent discussion on this ‘paradox’, see Hedge et al., 2018). Although the utility of the integration of the two paradigms has been acknowledged for quite some time

(Cronbach, 1957), it seems as if the resolution of this paradox requires additional work, and so does the introduction of a test measuring the EI_P component. Ultimately the current research is thought of as the foundation for the development of a new ability EI test and the first attempt to understand what this new measure might look like.

Of note, the introduction of a new test to measure EI_P would require a different research approach than the one employed across our two studies. A possibility would be to compare different emotional tasks usually employed in the cognitive and emotion literature in their capacity to reveal individual differences, for example by using scoring systems that maximize differences among individuals, instead of differences among conditions. Following from this, one would check the test-retest reliability in order to see whether such differences are temporally stable and whether the identified task/s predict additional variance.

By introducing EI_P as a new EI component, our contribution responds to the call to integrate more complex modeling into the EI literature, such as dual-process accounts of emotionally intelligent behavior (e.g., Fiori, 2009; Fiori & Vesely Maillefer, 2018). Indeed, EI_K depends more strongly on thoughtful reasoning about emotions and emotion information, whereas EI_P captures more spontaneous and associative emotional thinking. Of note, the results supporting the distinction between EI_K and EI_P within an overall EI factor is aligned with the association, significant but not particularly high, between implicit and explicit measures found in the social cognitive literature (Hofmann et al., 2005). Hence, the two EI components may capture related, but qualitatively distinct constructs. Although such constructs may require partially different methods to be measured, their correlation might be increased by reducing methodological differences, such as encouraging more spontaneous answers in EI_K tests (e.g., time-limited answers or based on RTs) or by employing EI_P scores that rely on correct answers, provided that no time limit is set for responding to trials.

Additional ways to measure EI_P that go beyond reaction time-based assessment might involve recording the activation of brain areas related to the processing of emotion information.

Besides providing a foundation for the development of new measures to assess EI, this research also has more practical implications. For example, current training programs on emotional competences are mainly based on the development of EI_K, for example, by deepening the knowledge individuals possess about how to use emotions in different circumstances. The identification of the EI_P component opens new avenues for EI training and the improvement of a wider range of emotional competences. There is now evidence that fluid aspects of intelligence can be trained and improved (Persson & Reuter-Lorenz, 2008). Thus, it follows that emotion information processing skills could be exercised and developed too, for example, by increasing or decreasing the reaction time required in the face of emotional stimuli so as to render these reactions more adaptive. Importantly, personalized training interventions could be put in place to strengthen the component that is less developed for each individual, either the EI_K or EI_P component, and to foster the joint contribution of both components. In fact, the two EI components could compensate for each other and/or work in concert (for an example of how the two EI components could compensate for each other or jointly contribute to better performance in the situation of a conflict at work see Vesely Maillefer, Udayar, & Fiori, 2018).

Limitations and Future Directions

Although we believe we have provided convincing evidence regarding a new conceptualization of EI, certain limitations should be taken into consideration. First, both studies were conducted in English, and most participants were non-native English speakers. Although one of the requirements for participating in the studies was to be fluent in English, and participants were studying at institutions in which English is frequently employed as the teaching and/or communication language, we do not know whether English as a second

language might have influenced results. Although we eliminated participants with a low self-reported level of English, the processing of a second language might have affected results. Second, some of the measures employed, in particular EI tests, were taken online and we do not know in which conditions participants were filling out the tests. We employed a rather strict procedure to address this issue, which involved removing participants that filled out the online tests too quickly. At the same time, we could not control for the conditions in which participants responded to the items. Another potential limitation resides in using a 1-item measure of overall performance. It should be noted though that the overall presentation evaluation was based on a series of criteria, in particular, clarity, organization, and coherence of the argument presented. Finally, it should be mentioned that for practical reasons we time-limited some of the intelligence tests in study 1; individuals who do not work well under time pressure (e. g., those suffering from anxiety, or those with low processing speed) might not have been accurately represented.

Overall, the results we present highlight the importance of acknowledging the role of emotion information processing in the EI literature and follow up on previous contributions that have gone in the same direction (Elfenbein et al., 2017; Fiori & Vesely, 2018; Vesely-Maillefer et al., 2018). Further research could explore other types of emotion-information processing and introduce a new EI measure that would capture stable individual differences in how individuals process emotion information.

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1 Table 1

2 Means, Standard Deviations, and Pearson Correlations of study 1.

| | N | Mean | Std. Deviation | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|--------------------------|-----|--------|----------------|--------|-------|---------|---------|---------|---------|---------|---------|--------|--------|--------|----|
| 1. Sex | 349 | 0.464 | 0.499 | 1 | | | | | | | | | | | |
| 2. Age | 330 | 21.370 | 3.325 | 0.049 | 1 | | | | | | | | | | |
| 3. Emotion understanding | 349 | 15.720 | 3.228 | .144** | 0.043 | 1 | | | | | | | | | |
| 4. Emotion management | 349 | 9.671 | 2.333 | .138** | 0.042 | .390** | 1 | | | | | | | | |
| 5. Emotion recognition | 320 | 27.380 | 5.093 | .178** | 0.003 | .281** | .264** | 1 | | | | | | | |
| 6. Emotional Stroop task | 341 | 0.085 | 0.057 | -0.1 | -0.09 | -0.11 | -.177** | -.121* | 1 | | | | | | |
| 7. Diff. Inhibition | 344 | 0.000 | 1.000 | -0 | -0.08 | -0.1 | -.143** | -0.09 | .175** | 1 | | | | | |
| 8. Diff. Activation | 344 | 0.000 | 1.000 | -0.08 | -0.03 | -.330** | -.184** | -.352** | .157** | 0 | 1 | | | | |
| 9. Verbal reasoning | 349 | 12.390 | 3.754 | 0.006 | 0.071 | .365** | .353** | .299** | -.187** | -.164** | -.257** | 1 | | | |
| 10. Vocabulary | 349 | 10.860 | 2.481 | -0.06 | 0.056 | .299** | .173** | .340** | -0.1 | -0.06 | -.272** | .349** | 1 | | |
| 11. Concept_formation | 349 | 29.250 | 5.476 | -0.04 | -0.04 | .256** | .191** | .294** | -0.04 | -.141** | -.293** | .471** | .327** | 1 | |
| 12. Progressive matrices | 349 | 49.630 | 6.249 | -0.05 | -0.04 | .288** | .241** | .230** | -.126* | -0.06 | -.369** | .494** | .195** | .570** | 1 |

4 Note. N = total sample size, Diff. Inhibition = Emotional Go/NoGo task-difficulty to inhibit responses, Diff. Activation = Emotional Go/NoGo task-difficulty to
5 activate.

6 * $p < .05$, ** $p < .01$, *** $p < .001$

1 Table 2

2 *Fit results of Structural Models of EI and of Emotional Intelligence (EI) with I (Intelligence) (N = 310).*

| | χ^2 | <i>df</i> | CFI | TLI | RMSEA | SRMR | AIC |
|--------------------------------------|-----------|-----------|-------|-------|-------|-------|---------|
| EI models | | | | | | | |
| 1. Unidimensional model | 24.69** | 9 | 0.885 | 0.808 | 0.075 | 0.051 | 5022.82 |
| 2. Two-factor model | 23.12** | 8 | 0.889 | 0.791 | 0.078 | 0.050 | 5023.25 |
| 2. Two-factor model (after MI) | 12.17 | 7 | 0.962 | 0.918 | 0.049 | 0.035 | 5014.31 |
| EI and I models | | | | | | | |
| 3. Unidimensional model | 113.61*** | 35 | 0.827 | 0.777 | 0.085 | 0.065 | 8075.91 |
| 4. Two-factor model | 81.83*** | 34 | 0.894 | 0.860 | 0.067 | 0.055 | 8046.13 |
| 5. Oblique 4-factor model | 62.25*** | 29 | 0.927 | 0.886 | 0.061 | 0.048 | 8036.55 |
| 5. Oblique 4-factor model (after MI) | 51.29** | 28 | 0.949 | 0.917 | 0.052 | 0.043 | 8027.59 |

3 *Note.* *df* = degrees of freedom, CFI = Comparative Fitness Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation, SRMR =
4 Standardized Root Mean square Residual, AIC = Akaike Information Criterion, MI = modification indices.

5 **p* < .05, ** *p* < .01, *** *p* < .001

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1 Table 3

2 *Standardized Parameter Estimates for EI (N = 310).*

| | 1. Unidimensional model | 2. two-factor model | | 3. two-factor model (after MI) | |
|--------------------------------|-------------------------|---------------------|-----|--------------------------------|-----|
| | | Elk | EIp | Elk | EIp |
| Emotion understanding | .58 | .59 | | .59 | |
| Emotion management | .59 | .60 | | .60 | |
| Emotion perception | .45 | .45 | | .45 | |
| Emotional Stroop task | -.28 | | .36 | | .37 |
| Diff. Inhibition | -.22 | | .24 | | .41 |
| Diff. Activation | -.39 | | .45 | | .58 |
| Covariances of the two factors | | -.79 | | -.62 | |

3 *Note.* MI = modification indices, Diff. Inhibition = Emotional Go/NoGo task-difficulty to inhibit responses, Diff. Activation = Emotional Go/NoGo task-
4 difficulty to activate, Elk = the Emotional Intelligence Knowledge component, EIp = the Emotion Information Processing component.

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13 Table 4

1 *Standardized Parameter Estimates for EI and I (N = 310).*

| | 1. Unidimensional model | 2. two-factor model | | 3. Oblique 4-factor model | | | | 3. Oblique 4-factor model (after MI) | | | |
|----------------------------|-------------------------|---------------------|-----|---------------------------|------|-----|-----|--------------------------------------|------|-----|-----|
| | | EI | G | Elk | Elp | Gc | Gf | Elk | Elp | Gc | Gf |
| Emotion understanding | .46 | .57 | | .58 | | | | .58 | | | |
| Emotion management | .49 | .59 | | .60 | | | | .60 | | | |
| Emotion perception | .40 | .46 | | .46 | | | | .46 | | | |
| Emotional Stroop task | -.26 | -.29 | | | .37 | | | | .39 | | |
| Diff. Inhibition | -.22 | -.24 | | | .26 | | | | .41 | | |
| Diff. Activation | -.32 | -.38 | | | .43 | | | | .54 | | |
| Vocabulary | .40 | | .38 | | | .39 | | | | .39 | |
| Verbal reasoning | .76 | | .79 | | | .81 | | | | .81 | |
| Raven Progressive Matrices | .59 | | .62 | | | | .69 | | | | .69 |
| Concept formation | .57 | | .61 | | | | .71 | | | | .70 |
| G | | .70 | | | | | | | | | |
| Elp | | | | -.80 | | | | -.64 | | | |
| Gc | | | | .75 | -.63 | | | .75 | -.48 | | |
| Gf | | | | .49 | -.50 | .81 | | .49 | -.42 | .81 | |

2 *Note.* Diff. Inhibition = Emotional Go/NoGo task-difficulty to inhibit responses, Diff. Activation = Emotional Go/NoGo task-difficulty to activate, G = general
3 intelligence, Elk = the Emotional Intelligence Knowledge component, Elp = the Emotion Information Processing component, Gc = Crystallized general
4 intelligence, Gf = fluid general intelligence, MI = modification indices.

17 Table 5

18 Means, Standard Deviations, and Pearson Correlations of Study 2.

| | N | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|----------------------------------|-----|---------|-----------|--------|--------|--------|--------|---------|-------|-------|-------|-------|-------|--------|--------|------|---------|--------|------|
| 1. Sex | 111 | 0.459 | 0.501 | 1.00 | | | | | | | | | | | | | | | |
| 2. English level | 111 | 3.595 | 0.578 | 0.05 | 1.00 | | | | | | | | | | | | | | |
| 3. Fluid intelligence (RPM) | 111 | 49.730 | 5.714 | -0.10 | 0.13 | 1.00 | | | | | | | | | | | | | |
| 4. Verbal reasoning (VR) | 111 | 11.950 | 4.149 | -0.02 | 0.11 | .577** | 1.00 | | | | | | | | | | | | |
| 5. Experimental condition | 111 | 0.500 | 0.502 | -0.05 | 0.10 | 0.05 | -0.02 | 1.00 | | | | | | | | | | | |
| 6. HEXACO_emotionality | 111 | 11.450 | 3.059 | .404** | 0.01 | 0.00 | 0.07 | -0.07 | 1.00 | | | | | | | | | | |
| 7. HEXACO_extraversion | 111 | 15.280 | 2.439 | 0.04 | 0.03 | 0.07 | -0.10 | -0.14 | -0.02 | 1.00 | | | | | | | | | |
| 8. HEXACO_agreeableness | 111 | 11.500 | 2.669 | -0.06 | -0.08 | 0.01 | 0.17 | -0.02 | 0.00 | -0.12 | 1.00 | | | | | | | | |
| 9. HEXACO_conscientiousness | 111 | 13.990 | 3.232 | 0.06 | -0.07 | -0.02 | -0.11 | -0.02 | 0.03 | .223* | -0.13 | 1.00 | | | | | | | |
| 10. HEXACO_openness | 111 | 14.790 | 2.454 | -0.06 | -0.06 | 0.12 | 0.14 | -0.06 | -0.13 | 0.10 | -0.05 | 0.05 | 1.00 | | | | | | |
| 11. Emotion Understanding (STEU) | 111 | 15.500 | 3.739 | -0.01 | .297** | .278** | .341** | -0.12 | -0.05 | 0.05 | 0.07 | -0.08 | 0.06 | 1.00 | | | | | |
| 12. Emotion Management (STEM) | 111 | 9.344 | 2.360 | 0.09 | .242* | .281** | .435** | -0.02 | 0.09 | 0.07 | 0.06 | 0.08 | -0.01 | .499** | 1.00 | | | | |
| 13. Emotion Recognition (GERT) | 103 | 27.800 | 5.165 | 0.16 | 0.05 | .195* | .285** | -0.06 | 0.14 | -0.05 | 0.00 | -0.06 | 0.01 | .269** | .263** | 1.00 | | | |
| 14. Attentional Task (Dot probe) | 106 | 519.578 | 250.035 | 0.06 | -0.09 | -0.14 | -0.08 | 0.01 | .193* | 0.03 | -0.11 | -0.01 | -0.04 | -.208* | 0.03 | 0.13 | 1.00 | | |
| 15. Performance_O | 111 | 3.473 | 1.198 | -0.07 | .214* | 0.07 | 0.18 | -.559** | 0.07 | 0.10 | 0.10 | -0.03 | 0.17 | .315** | 0.14 | 0.03 | -.240* | 1.00 | |
| 16. Performance_C | 111 | 5.511 | 1.940 | 0.02 | 0.16 | 0.05 | 0.18 | -.534** | 0.04 | 0.16 | 0.02 | -0.10 | 0.17 | .261** | 0.16 | 0.08 | -.254** | .889** | 1.00 |

Note. N = total sample size, RPM = Raven Progressive Matrices, VR = Verbal Reasoning test, Experimental Condition (0 = control condition, 1 = stress condition), STEU = Situational Test of Emotional Understanding, STEM = Situational Test of Emotion Management, GERT = Geneva Emotion Recognition Test short version, Performance-O = performance overall, Performance-C = charismatic performance

*p < .05, ** p < .01, *** p < .001

Table 6

Hierarchical regression ($N = 99$). The contribution of intelligence, personality traits and control variables (block 1), EI_K (block 2), and EI_P (block 3) to overall performance (a) and charismatic performance (b).

a) Overall performance

| | | B | Robust Std. Error | Beta | t | p-value | 95.0% Confidence Interval for B | |
|-------------------------------|------------------------------|-----------------|----------------------|--------|--------|---------|---------------------------------|-------------|
| | | | | | | | Lower Bound | Upper Bound |
| Block 1 | | | | | | | | |
| | Sex | -0.380 | 0.230 | -0.155 | -1.650 | 0.102 | -0.836 | 0.077 |
| | Englishlevel | 0.641 | 0.164 | 0.305 | 3.920 | 0.000 | 0.316 | 0.966 |
| | Fluid intelligence | -0.015 | 0.026 | -0.072 | -0.590 | 0.558 | -0.068 | 0.037 |
| | Verbal reasoning | 0.047 | 0.031 | 0.160 | 1.540 | 0.128 | -0.014 | 0.108 |
| | Stress condition | -1.406 | 0.194 | -0.574 | -7.260 | 0.000 | -1.791 | -1.021 |
| | Emotionality (HEXACO) | 0.037 | 0.035 | 0.093 | 1.060 | 0.292 | -0.033 | 0.107 |
| | Extraversion (HEXACO) | 0.023 | 0.039 | 0.044 | 0.580 | 0.564 | -0.055 | 0.100 |
| | Agreeableness (HEXACO) | 0.053 | 0.036 | 0.116 | 1.480 | 0.143 | -0.018 | 0.123 |
| | Conscientiousness (HEXACO) | 0.018 | 0.031 | 0.046 | 0.570 | 0.567 | -0.044 | 0.079 |
| | Openness (HEXACO) | 0.078 | 0.036 | 0.159 | 2.170 | 0.033 | 0.006 | 0.150 |
| Block 2 | | | | | | | | |
| | Emotion understanding (STEU) | 0.081 | 0.029 | 0.233 | 2.780 | 0.007 | 0.023 | 0.139 |
| | Emotion management (STEM) | -0.049 | 0.053 | -0.087 | -0.930 | 0.354 | -0.154 | 0.056 |
| | Emotion recognition (GERT) | -0.007 | 0.017 | -0.029 | -0.420 | 0.678 | -0.041 | 0.027 |
| Block 3 | | | | | | | | |
| | Attentional task (dot probe) | -0.001 | 0.000 | -0.168 | -3.120 | 0.002 | -0.001 | 0.000 |
| R² block 1 | | 0.481*** | | | | | | |
| ΔR² block 2 | | 0.035^ | | | | | | |
| ΔR² block 3 | | 0.024* | | | | | | |
| R² total | | 0.54 | | | | | | |

Note. STEU = Situational Test of Emotional Understanding, STEM = Situational Test of Emotion Management, GERT = Geneva Emotion Recognition Test short version. ^p < .06, *p < .05, ** p < .01, *** p < .001

b) Charismatic performance

1

| | | B | Robust Std. Error | Beta | t | p-value | 95.0% Confidence Interval for B | |
|-------------------------------|------------------------------|-----------------|----------------------|--------|--------|---------|---------------------------------|-------------|
| | | | | | | | Lower Bound | Upper Bound |
| Block 1 | | | | | | | | |
| | Sex | -0.255 | 0.396 | -0.065 | -0.640 | 0.521 | -1.041 | 0.531 |
| | Englishlevel | 0.786 | 0.288 | 0.234 | 2.730 | 0.008 | 0.213 | 1.358 |
| | Fluid intelligence | -0.024 | 0.051 | -0.070 | -0.460 | 0.643 | -0.126 | 0.078 |
| | Verbal reasoning | 0.082 | 0.048 | 0.175 | 1.710 | 0.090 | -0.013 | 0.178 |
| | Stress condition | -2.221 | 0.328 | -0.568 | -6.770 | 0.000 | -2.873 | -1.569 |
| | Emotionality (HEXACO) | 0.019 | 0.057 | 0.030 | 0.340 | 0.734 | -0.094 | 0.133 |
| | Extraversion (HEXACO) | 0.087 | 0.067 | 0.107 | 1.310 | 0.194 | -0.045 | 0.220 |
| | Agreeableness (HEXACO) | 0.020 | 0.052 | 0.028 | 0.390 | 0.698 | -0.083 | 0.123 |
| | Conscientiousness (HEXACO) | -0.044 | 0.048 | -0.073 | -0.930 | 0.355 | -0.139 | 0.050 |
| | Openness (HEXACO) | 0.108 | 0.063 | 0.137 | 1.700 | 0.092 | -0.018 | 0.233 |
| Block 2 | | | | | | | | |
| | Emotion understanding (STEU) | 0.077 | 0.057 | 0.137 | 1.340 | 0.183 | -0.037 | 0.190 |
| | Emotion management (STEM) | -0.037 | 0.092 | -0.041 | -0.400 | 0.691 | -0.220 | 0.146 |
| | Emotion recognition (GERT) | 0.013 | 0.030 | 0.033 | 0.440 | 0.663 | -0.046 | 0.072 |
| Block 3 | | | | | | | | |
| | Attentional task (dot probe) | -0.002 | 0.001 | -0.232 | -3.210 | 0.002 | -0.003 | -0.001 |
| R² block 1 | | 0.443*** | | | | | | |
| ΔR² block 2 | | 0.015 | | | | | | |
| ΔR² block 3 | | 0.045** | | | | | | |
| R² total | | 0.503 | | | | | | |

Note. STEU = Situational Test of Emotional Understanding, STEM = Situational Test of Emotion Management, GERT = Geneva Emotion Recognition Test short version. *p < .05, ** p < .01, *** p < .001

Table 7

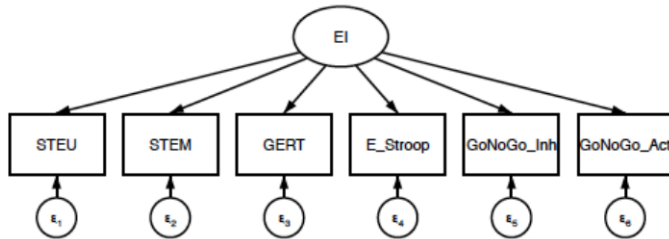
Hierarchical regression ($N = 99$). Parsimonious model including only the significant predictors in the full regression model (Table 6a): Control variables (block 1), EI_K Emotion Understanding (block 2), and EI_P attentional task (block 3) to overall performance.

a) Overall performance

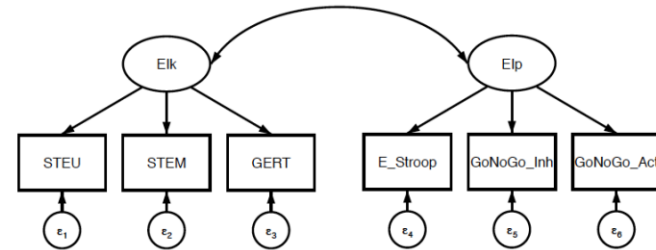
| | | B | Robust Std. Error | Beta | t | p-value | 95.0% Confidence Interval for B | |
|-------------------------------|------------------------------|--------|----------------------|--------|--------|---------|---------------------------------|-------------|
| | | | | | | | Lower Bound | Upper Bound |
| Block 1 | | | | | | | | |
| | English level | 0.612 | 0.161 | 0.293 | 3.800 | 0.000 | 0.293 | 0.932 |
| | Stress condition | -1.379 | 0.189 | -0.571 | -7.290 | 0.000 | -1.754 | -1.003 |
| | Openness (HEXACO) | 0.081 | 0.033 | 0.163 | 2.490 | 0.015 | 0.016 | 0.146 |
| Block 2 | | | | | | | | |
| | Emotion understanding (STEU) | 0.071 | 0.024 | 0.207 | 2.940 | 0.004 | 0.023 | 0.119 |
| Block 3 | | | | | | | | |
| | Attentional task (dot probe) | -0.001 | 0.000 | -0.172 | -3.540 | 0.001 | -0.001 | 0.000 |
| R² block 1 | 0.403*** | | | | | | | |
| ΔR² block 2 | 0.037** | | | | | | | |
| ΔR² block 3 | 0.028** | | | | | | | |
| R² total | 0.47 | | | | | | | |

Note. STEU = Situational Test of Emotional Understanding. * $p < .05$, ** $p < .01$, *** $p < .001$.

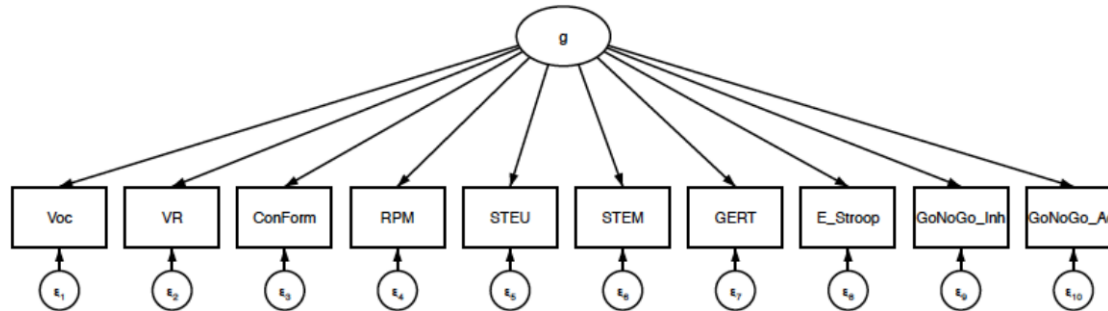
1. Unidimensional model of EI



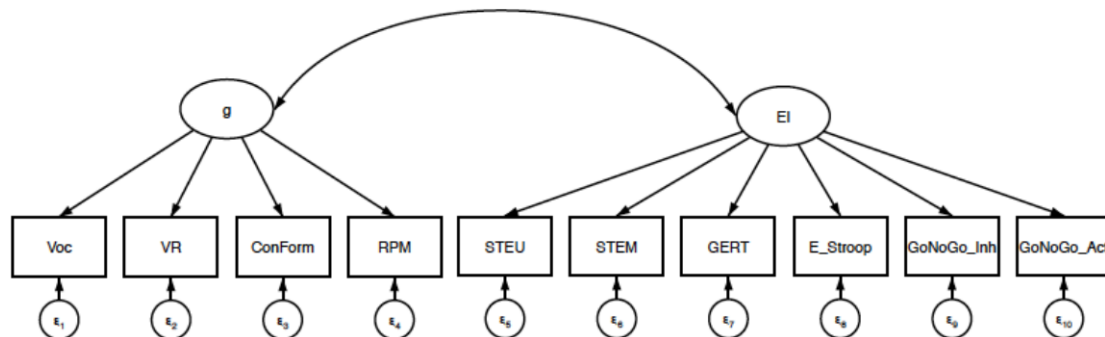
2. Two-factor model of EI



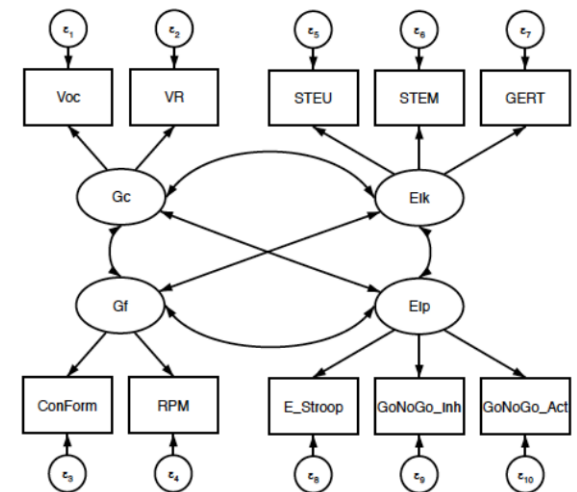
3. Unidimensional model of EI and I



4. Two-factor model of EI and I



5. Oblique 4-factor model of EI and I



1 Figure 1. Structural models for CFA.
2 STEU = Situational Test of Emotion Understanding, STEM = Situational Test of Emotion Management, GERT = Geneva Emotion
3 Recognition Test, E_Stroop = Emotional Stroop Task, GoNoGo_Inh = Emotional Go/NoGo task-difficulty to inhibit responses,
4 GoNoGo_Act = Emotional Go/NoGo task-difficulty to activate, g = general intelligence, Elk = the Emotional Intelligence Knowledge
5 component, EIp = the Emotion Information Processing component, Gc = Crystallized intelligence, Gf = fluid intelligence, ConForm =
6 Concept Formation, RPM = Raven Progressive Matrices, Voc = Vocabulary, VR = Verbal Reasoning, I = Intelligence, EI = Emotional
7 Intelligence.