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Personality and the Accurate Perception of Facial Emotion Expressions: What Is Accuracy and How Does It Matter?

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Research into Emotion Decoding Accuracy (EDA) has revealed limited associations with personality. One possible reason could be the neglect of social context influences on the perception of emotions, which is problematic given the interplay of personality with social context. We propose a novel way to understand accuracy in emotion perception, which includes social context and the distinction between accuracy (perceiving the intended emotions) and inaccuracy (perceiving additional emotions to those expressed). In seven studies that utilized three methods, we found that personality traits that tap the social domain, consistently relate, in a meaningful way, to accuracy and inaccuracy in emotion perception. Accuracy and inaccuracy capture different aspects of the variance and do so more than traditional, hit rate based, methods and tests for assessing the accurate decoding of facial emotion expressions.

Keywords: accuracy, bias, emotion perception, social perception, person-situation

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Whether talking to a friend who enthusiastically shares a recent emotional experience, or a partner complaining about their day at work, even casual everyday social interactions are colored in emotion. In emotional exchanges the accurate recognition of those emotions (*Emotion Decoding Accuracy, EDA*) is crucial for the regulation of social and personal relationships (Manstead et al., 1999) as it helps coordination with others, communication in general, and provides the necessary "affective glue" in dyadic interactions (Feldman et al., 1991). The ability to decode other peoples' emotions is a central human skill (Salovey & Mayer, 1990) and an inherently functional dyadic phenomenon (Schmidt & Cohn, 2001; Niedenthal & Brauer, 2012). In real life, EDA almost always occurs in a context (Barrett & Kensinger, 2010; Hess & Hareli, 2018). Yet, emotion decoding accuracy research has typically used context-free facial expressions as stimuli.

Among other limitations (Fischer et al., 2019), this neglect of social context has impacted our understanding of the link between EDA and personality, namely, the stable patterns of thinking, feeling, and behaving consistently observed across situations (Baumert et al., 2017). In fact, there is agreement that EDA should be related to personality. EDA is a core aspect of emotional intelligence (Lopes et al., 2004; Salovey & Mayer, 1990) and to the degree that emotion recognition ability is important for smooth everyday interactions, a relationship with personality variables that tap the social functioning spectrum should be evident. Yet, as consistently noted across the years Elfenbein & Ambady, 2002; Matsumoto et al., 2000) the evidence linking personality with decontextualized assessments of EDA is scattered and does not easily replicate across studies. For example, Matsumoto et al. (2000) found correlations between the Caucasian Brief Affect Recognition test (JACBART) and openness and conscientiousness in three studies but failed to replicate findings for neuroticism and extraversion. A study assessing EDA from different nonverbal channels found visual and auditory EDA ability to be largely unrelated to personality (Bänziger et al., 2009). Even more surprising is null or inconsistent evidence for a relationship between EDA and emotional intelligence (EI) measured either as a trait (Matthews et al., 2015) or as an ability (Austin, 2005; Farrelly & Austin, 2007).

This does not mean that there is no evidence for a link between EDA and some personality constructs. Evidence for a link between EDA and alexithymia (Ihme et al., 2014), as well as narcissism (Martins et al., 2019), and attachment style (Chris Fraley et al., 2006) has emerged, especially when considering extreme groups,

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but often only for some emotions and not for others. An extensive review of the literature, presented in online Supplemental Materials Table S1, highlights these inconsistencies.

We argue that the reason why the literature fails to provide reliable evidence for a link between personality with EDA, is the limited conceptualization and operationalization of EDA. Specifically, traditionally, this research stresses intraindividual processes and neglects the social function of both EDA (Fischer et al., 2019) and personality (Mischel & Shoda, 1995). We test this assertion empirically in seven studies using a contextualized assessment of EDA.

The Decontextualized Paradigm in EDA and Its Limitations

Tett and Guterman noted (Tett & Guterman, 2000, p. 398) that "... the behavioral expression of a trait requires arousal of that trait by trait-relevant situational cues." However, the same is true for the testing of an ability. Human emotion recognition ability has developed as a skill for mastering social situations, not as a means to solve cognitive puzzles. Yet, standard EDA testing is set up as exactly such a cognitive puzzle.

That is, participants are usually presented with contextless, prototypical facial expressions drawn from standardized sets of facial expressions (PAF, Ekman & Friesen, 1976; KDEF, Lundqvist et al., 1998; ERI, Scherer & Scherer, 2011), or with (facial) recognition tasks (DANVA, Nowicki & Duke, 2001; JACBART, Matsumoto et al., 2000; PONS, Rosenthal et al., 1979; GER[faces], Schlegel et al., 2019); MSCEIT[faces], Mayer et al., 2003).[1] These tests require participants to select from a list of emotion labels the one that best describes the depicted emotional expression. That is, decoding accuracy is defined as the ability to associate one (correct) label with a single emotion expression shown without social context. This implies that this type of stimulus does not engage participants' social competences and ignores the important impact of context for emotion recognition (Barrett et al., 2011; Hess & Hareli, 2014). A second important drawback of this approach is that the underlying definition of what constitutes accuracy in decoding emotion is limited.

In the classic emotion decoding literature described above, a rating is considered accurate when the chosen label corresponds to the criterion label established by the researcher, otherwise it is considered inaccurate. In this approach, typically, accuracy/inaccuracy is calculated on the basis of hit rates (the proportion of target stimuli correctly identified). Beyond measurement problems inherently evident in a hit rates method for measuring EDA (Wagner, 1993), this approach implicitly assumes that expressions can be accurately described by a single emotion label. This may be the case for highly stereotypical expressions but is less likely for the more ambiguous expressions of everyday life (Motley & Camden, 1988). However, even if a ground truth (Funder, 1995) can be established suggesting that the expression can be adequately labeled with just one label, observers still tend to see multiple emotions (Russell & Fehr, 1987; Russell et al., 1993; Yrizarry et al., 1998).

Yet, the traditional use of hit-rates allows only one form of inaccuracy to be assessed—mistaking one emotion for another. Lyusin and Ovsyannikova (2016) suggest the use of a multidimensional response format or scalar rating scales (see also, Matsumoto, 2005) where participants are asked to indicate all the emotions they can discern in an expression. This procedure allows a different form of inaccuracy to be revealed—the common tendency mentioned above, to perceive additional emotions to those expressed. In other words, to see emotions as mixed. However, this form of inaccuracy—contrary to the mislabeling of emotions in a forced choice task—does not necessarily result in a trade off such that more accuracy automatically entrains less inaccuracy. In fact, dominant models of social perception (Funder, 1995; West & Kenny, 2011) strongly maintain that accuracy and inaccuracy/bias in social perception are theoretically distinct processes and bias is distinct from error.

In their seminal Truth and Bias model, West and Kenny (2011) specifically argue (p. 358) that "... certain psychological mechanisms lead perceivers to be both accurate and biased, other mechanisms lead to more accuracy and less bias." As such, hit rates should not be systematically correlated with either accuracy nor bias as they tap different ways of decoding—a categorical approach in which only a predominant expression is identified and a dimensional approach where the degree to which the target expression (accuracy) or other expressions (inaccuracy) are perceived is assessed. With few exceptions (Hess et al., 2016; Kafetsios & Hess, 2013, 2019) the truth and bias model has not been applied to EDA research and in particular when examining EDA relationships with personality traits. Rather, research on emotion decoding accuracy has focused on the presentation of context-free highly prototypical facial expressions, typically assessed only with regard to the most prominently visible emotion via a forced choice task.

Personality Relationships With EDA

This context-free approach may also be what limits the possible relationship of EDA measured with personality as it has become clear that social context is a critical component of personality. According to an influential model (Mischel & Shoda, 1995), personality has to be understood as a system that mediates how the individual selects, construes and processes social information and generates social behaviors. The Cognitive-Affective Processing System (CAPS) model posits social situation as a critical component of personality in that what happens in social situations very much reflects individual differences in cognitive-affective processing (Zayas et al., 2002). The properties of particular personality dimensions are likely to emerge in particular situations and it is information from both individual differences in personality and those situations that can provide particularly informative predictions regarding personality-behavior links (Zayas et al., 2002). Such an approach reflects the meaning of Lewin's (1951) B = f(P, E) formula (see Funder, 2009).

As such, presenting information in a socially disengaged manner, such as typical of the traditional EDA tasks, reduces its pertinence for personality-mediated processes. Yet, the underlying definition and notion of what constitutes accuracy is limited when EDA is examined devoid of social context both in terms of the

[1] The list does not include tasks that do not specifically assess the decoding accuracy of facial emotion expressions (e.g., the Ickes empathic accuracy paradigm [Ickes, 1997], or other measures of interpersonal sensitivity, see Hall et al., 2009, for a comprehensive review).

task at hand (single faces) and with regard to the personality correlates of EDA.

The Present Study

Based on these considerations we predicted that using a socially engaging EDA task (the Assessment of Contextualized Emotions, ACE) which differentiates between accuracy and inaccuracy would allow the link between personality and emotion recognition accuracy to emerge. We focused, in particular, on personality dimensions that tap the social domain (interpersonal, social characteristics), especially personality dimensions for which there is some evidence for associations with EDA: Extraversion, Openness, Agreeableness, Conscientiousness (Matsumoto et al., 2000; Terracciano et al., 2003), attachment orientations (Chris Fraley et al., 2006), alexithymia (Ihme et al., 2014), independent and interdependent self-construal (Lau et al., 2009), emotion regulation (Bebko et al., 2011), and emotional intelligence (measured both as an ability Mayer et al., 2003, and as a trait Wong & Law, 2002).

Accordingly, previous research has found ACE accuracy was associated with trait independence (Kafetsios & Hess, 2013) and ACE inaccuracy was associated with the Difficulty in Identifying Feelings subscale of the Toronto Alexithymia Scale (Kafetsios & Hess, 2019). ACE Accuracy and Bias had unique, measurable and theoretically meaningful effects for social interaction outcomes (perceived affect, interaction satisfaction, support, and emotion suppression; Hess et al., 2016; Kafetsios & Hess, 2019), interaction dimensions that are also known to relate to personality traits (e.g., extraversion, Eaton & Funder, 2003; agreeableness, Tov et al., 2016; emotion suppression, Butler et al., 2003). Therefore, in addition to personality traits that tap the social domain we also included measures of social relating outcomes (loneliness, well-being, and positive and negative affect).

To support our proposition that the link between personality traits that tap the social domain and emotion recognition accuracy should become evident when using contextualized stimuli and when both accuracy and inaccuracy are measured, we present data from seven studies with a total of 1,302 participants conducted in two laboratories. A central question tested in all studies was whether a traditional hit rates approach—associating one (correct) label to a single emotion expression—can provide the same information as the accuracy and bias approach of the ACE. Across all studies, the assessment of accuracy and inaccuracy in a contextualized assessment of emotion was expected to be superior to simple hit rates in revealing associations with personality traits. All data described in this paper are available at Open Science Framework (osf.io/e97k3). The studies were not preregistered.

Method

General Overview

The data we present in this article were collected at the Emotion and Social Interaction Laboratory and the Social Psychophysiology Laboratory between 2009 and 2018. Participants (73.5% women) were University students and members of the community (11% of the total sample) between the ages of 18 and 60. Studies 1–6 were conducted in a laboratory setting. Study 7 was conducted online (see Table 1, for detailed participant information). All studies were conducted in compliance with the American Psychological Association (APA) ethical standards in the treatment of human participants and description of participant treatment. Study 6 was approved by the Humboldt University Psychology Department Research Ethics Committee and Study 7 by the University of Crete, Department of Psychology research ethics committee. Studies 1–5 were conducted at the Emotion and Social Interaction Laboratory before approval by an Institutional Review Board was required of this type of research.

In what follows, we describe the three data sets, which differ in the specific emotion recognition task used. Dataset 1 comprised data from five studies using the ACE-Cartoons (Kafetsios & Hess, 2013, 2015). Dataset 2 is based on a study conducted using the ACE-Faces long (Hess et al., 2016). Dataset 3 is based on an online study using a short version of the ACE-Faces (Kafetsios & Hess, 2018). In all cases, participants completed a set of personality questionnaires in a separate session or online at home before coming to the laboratory for the emotion-decoding task or to completing a separate online assessment (Dataset 3).

Emotion Recognition Tasks

ACE-Cartoons (Kafetsios & Hess, 2013). The ACE-Cartoons utilizes cartoons to assure the presence of highly standardized "pure" emotions. The use of pure emotions makes it easy to meaningfully define the signal, but, such pure expressions are rare in nature. The test was designed following Masuda et al. (2008), such that a central character's facial expression was either congruent or incongruent with the expressions shown by the surrounding group. All possible combinations between the three emotions and neutral were included. The group was shown either facing the central

Table 1
Summary of Study Characteristics

Study	Year	Country	Instrument	*N*	Age (*M*, *SD*)	Women	Accuracy (*M*, *SD*)	Inaccuracy (*M*, *SD*)	Hit rates (*M*, *SD*)	$r_{(A,I)}$
1	2009	GR	ACE-Cartoons	214	23.93 (6.00)	73.4%	6.23 (.62)	2.40 (.57)	.46 (.18)	.01
2	2011	GR	ACE-Cartoons	74	22.99 (3.24)	78.2%	6.09 (.71)	2.43 (.52)	.41 (.20)	−.15
3	2013	GR	ACE-Cartoons	104	21.04 (3.17)	63.5%	5.97 (.87)	2.58 (.64)	.37 (.18)	−.06
4	2015	GR	ACE-Cartoons	125	25.52 (7.91)	76.4%	6.01 (.82)	2.52 (.60)	.41 (.19)	−.05
5	2015	GR	ACE-Cartoons	50	30.00 (13.42)	57.7%	5.84 (.76)	2.19 (.60)	.35 (.19)	−.33*
6	2012	DE	ACE-Faces	154	26.22 (5.05)	70.0%	5.09 (.64)	2.31 (.46)	.53 (.14)	.38***
7a	2018	GR	ACE-Faces short	523	21.96 (6.60)	49.1%	5.19 (.78)	2.27 (.64)	.53 (.15)	.32***
7b	2018	GR	ACE-Faces short	58	20.52 (1.63)	56.7%	5.45 (.81)	2.11 (.68)	.57 (.12)	.18

Note. ACE = Assessment of Contextualized Emotions; DE = Germany; GR = Greece. r(A,I) = correlation between Accuracy and Inaccuracy.
* $p < .05$. ** $p < .01$. *** $p < .001$.

character or facing the observer resulting in a total of 4 (target emotion expression: happiness, sadness, anger, neutral) × 4 (group emotion expression: happiness, sadness, anger, neutral) × 2 (group orientation) = 32 stimuli. Figure 1 shows an example for congruent anger for the two types of group orientation. Perceivers' (participants') task was to rate the central character's emotion expressions (happiness, anger, sadness, or neutral) on each of the following 7-point scales anchored with 1 = *not at all* and 7 = *very much: calm, fear, anger, surprise, disgust, sad, and happy*.

ACE-Faces

The ACE-Faces (Hess et al., 2016) portrays relatively pure emotional expressions that represent an actual social situation (three persons in a group), including both congruent and incongruent facial expressions, and uses multidimensional response scalar rating scales for the measurement of *both* Accuracy *and* Bias (perceiving additional emotions to those expressed) in emotion recognition.

The ACE-Faces stimuli (see Figure 2 for an example) were produced from a set of spontaneous facial expressions that were filmed during a social interaction in which targets talked about a shared emotion eliciting event. This relived emotion task is an effective emotion eliciting technique (Levenson et al., 1991). Groups of three *friends* were arranged in an open semicircle, and the central person in this group was instructed to recall and vividly recount an event where they had felt happiness, sadness, disgust, and anger, respectively. Images were then selected when all three individuals showed the same expressions (congruent condition) and for the incongruent condition the expression of the central character was framed with images of the friends showing neutral expressions. The complete set comprises 48 images (2 male and 2 female groups × 3 presentation conditions, group congruent, group incongruent, individual × 4 emotions, happy, sad, disgust, and angry). The photo was considered to be representative of the target emotion if at least 50% (chance accuracy = 12.5%) of a separate group of 26 raters rated the expression highest on the target scale. Participants rated the central person's emotion expressions on each of the following 7-point scales anchored with 1 = *not at all* and 7 = *very much: calm, fear, anger, surprise, disgust, sad, and happy*.

ACE-Faces Short

The Ace-Faces short consists of a smaller set of 16 images from the full set of ACE-Faces. These were chosen from the larger ACE based on the reliability of the ratings to be able to conduct studies in which less time was available for the emotion recognition task. The set includes eight male and eight female expressions of anger, disgust, happiness, and sadness.

Accuracy, Bias, and Hit Rates

For all three ACE versions accuracy was scored as the rating on the target scale and inaccuracy was scored as the mean ratings on the remaining scales as depicted above, for example, when an anger expression was rated, the rating on the anger scale was scored as accuracy and the mean of the remaining ratings as inaccuracy/bias. Hit rates were scored as follows, the score was 1 when the rating on the target scale (i.e., anger for an anger expression) was higher than any rating on any of the remaining scales), otherwise the score was 0. Accuracy, bias scores and hit rates were calculated separately for each emotion and later combined.

Control Measures

In Studies 1, 6, and 7, we included an additional measure of emotion recognition ability, the Faces part of the MSCEIT (Mayer, Salovey, Caruso Emotional Intelligence Test; Mayer et al., 2003) where participants report on the emotional content of each subtly emotional face by rating the degree of happiness, fear, surprise, disgust, and excitement on a 5-point scale (1 = *no emotion* and 5 = *extreme amount of emotion*). Ratings were consensus scored using an available large culture-specific Greek or German database.

Studies 1 to 5

Studies 1 to 5 were conducted to assess the association between personality traits that reflect tendencies that tap social and emotional capabilities and emotion recognition assessed with standard hit rates compared with the accuracy and inaccuracy indices we propose and with a use of a novel emotion recognition task (ACE-Cartoons) that includes context of other faces surrounding a central character whose expression is to be judged.

Method

Participants

A total of 567 participants (186 men, 15 gender unknown, age range = 18–60, M_{age} = 24.18, SD_{age} = 7.16 see Table 1 for participant characteristics) took part in five studies in which emotion recognition ability was assessed using the ACE-Cartoons. A battery of personality tests was completed by participants before visiting the laboratory (see Table 2 for measures).[2]

Materials and Procedure

Upon arrival, participants were informed that the aim of the study is to assess how people perceive emotions and that anonymity was guaranteed. After providing informed consent by virtue of questionnaire completion, they completed a battery of individual difference measures that included the Faces section of the MSCEIT (Mayer et al., 2003), the Experiences in Close Relationships Questionnaire (Fraley et al., 2000), the Self-construal scale (Singelis, 1994), the Big-Five inventory (BFI-K; Rammstedt & John, 2005), the Wong and Law Emotional Intelligence Scale (Wong & Law, 2002), the Diener et al. (2010) psychological well-being scale.[3,4] Basic psychometric properties of the scales are presented in the online Supplemental Materials S2.

[2] For all scales we followed the anchoring presented in the introduction. In Studies 4 and 5 the TIPI was measured on a 5-point scale (whereas in Studies 1 and 2 it was measured with a 7-point scale).

[3] Following information about the aims of the study, the right to withdraw at any point, and anonymity, the first page of the survey stated that completion of the questionnaire constituted proof of participants' informed consent to take part in the study.

[4] In some cases, participants had already completed the questionnaires that had been provided to them by the research assistants in class

Figure 1
Example Stimuli From the Assessment of Contextualized Emotions-Cartoons (ACE-Cartoons) Task

Results

We first assessed the reliability of the accuracy measures across stimuli and studies. Internal consistency estimates for accuracy scores ($\alpha = .89$), inaccuracy scores ($\alpha = .92$), and hit rates ($\alpha = .84$) were high enough to allow us to create a single average score for each measure. Inaccuracy was negatively correlated with hit rates, $r(567) = -.47$, $p < .001$, and accuracy scores, $r(567) = -.09$, $p < .05$. Accuracy was positively correlated with hit rates, $r(567) = .35$, $p < .001$.

Mini meta-analyses (Goh et al., 2016) were used to combine the test correlations between the ACE-Cartoons and personality measures appearing in more than one study. We then evaluated across the five studies correlations between personality characteristics and accuracy and inaccuracy ratings. Separate meta-analyses were performed for each personality trait (see Table 2). Fixed effects were used in which each mean effect size (i.e., mean correlation) was weighted by sample size. Correlations were first Fisher z transformed and then averaged. Mean correlations were converted back to Pearson correlations for ease of presentation.

We regressed personality variables (see Table 3) that were significantly correlated with one of the emotion perception indices on ACE accuracy and inaccuracy (see Table 2 for correlations) as well as hit rate accuracy.[5] Overall, ACE accuracy and inaccuracy were consistently and meaningfully associated with several personality traits that tap the social domain, over and above hit rate accuracy, which was not associated with any of the personality traits.

Specifically, ACE inaccuracy was a positive predictor of avoidant attachment ($\beta = .15$, $t = 3.18$, $p < .01$), negative affect ($\beta = .21$, $t = 4.30$, $p < .001$), conscientiousness ($\beta = .13$, $t = 2.47$, $p < .05$), and emotional stability/neuroticism ($\beta = .13$, $t = 2.43$, $p < .05$), and was a negative predictor of reappraisal—albeit at marginally nonsignificant level ($\beta = -.10$, $t = -1.93$, $p = .054$), interdependent self-construal ($\beta = .09$, $t = -1.97$, $p = .05$), and positive affect ($\beta = -.12$, $t = -2.27$, $p < .05$). ACE accuracy was a positive independent predictor of reappraisal ($\beta = .12$, $t = 2.14$, $p < .05$), independent self-construal ($\beta = .11$, $t = 2.25$, $p < .05$), extraversion ($\beta = .13$, $t = 2.43$, $p < .05$), agreeableness ($\beta = .13$, $t = 2.36$, $p < .05$), openness ($\beta = .14$, $t = 2.62$, $p < .01$), and conscientiousness ($\beta = .15$, $t = 2.73$, $p < .01$) and a negative predictor of emotional suppression ($\beta = -.13$, $t = -2.37$, $p < .05$) and avoidant attachment albeit at nonsignificant level ($\beta = -.09$, $t = -1.92$, $p = .056$).

Discussion

We meta-analyzed a set of five laboratory studies on the relationship between personality traits and three emotion decoding accuracy indices (Accuracy, Inaccuracy and Hit rates) based on a novel emotion decoding assessment, the ACE-Cartoons. The ACE-Cartoons task infuses context in the emotion perception process by manipulating the facial expressions of characters peripheral to the person's facial expressions to be decoded and allows for separating accuracy and inaccuracy in emotion decoding.

As predicted, classic hit rates did not correlate with any of the personality characteristics. By contrast, important emotion and relationship-related personality characteristics were meaningfully related to accuracy and inaccuracy over and above the effect of hit rates. Hit rates were weakly and negatively associated with accuracy suggesting that the two indices tap different emotion decoding processes.

Study 6

The use of emotional expressions depicted in cartoons is not ideal. Emotion Recognition tasks that involve cartoons can amplify ERA because there is less distracting information than in real faces (Benson & Perrett, 1991) and facial expressions are more stereotypical (Calder et al., 1997). Therefore, Studies 6 and 7 were conducted to further test relationships between ACEs using real human facial expressions and personality. ACE-faces is a set of *spontaneous* facial expressions similar to those that occur during social encounters. Accuracy and inaccuracy in the ACE-Faces predicted the quality of everyday social interaction in meaningful ways in different countries (Hess et al., 2016).

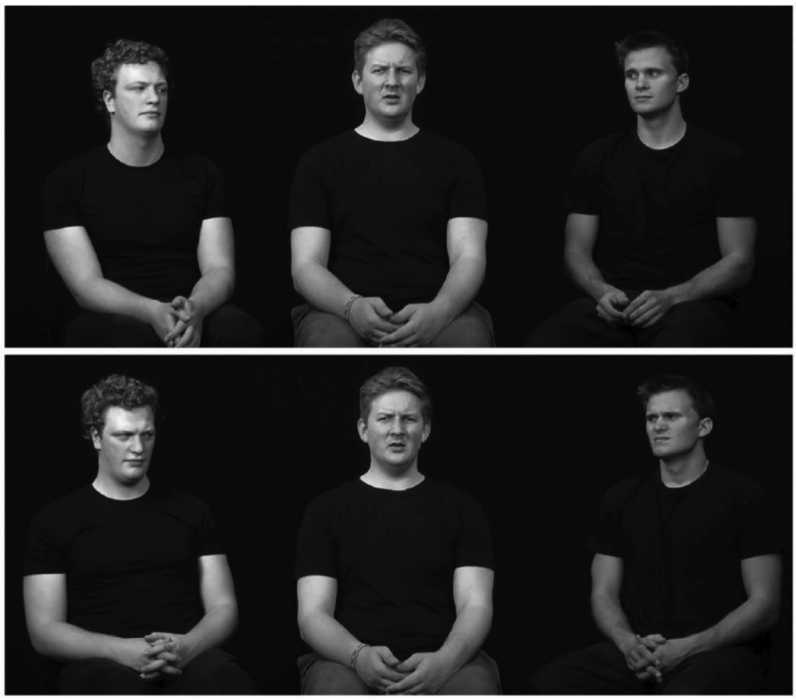
Method

Participants

One hundred and fifty-four participants (47 men, $M_{age} = 26.22$, $SD = 5.05$; see Table 1) completed the ACE-Faces. Upon arrival, participants were informed that the aim of the study is to assess how people perceive emotions. After providing informed consent by virtue of questionnaire completion, they completed a battery of

[5] In the case of the TIPI, to render measures comparable for analyses, we used the standardized scores from Study 2, three with the standardized scores from Studies 5 and 6.

Figure 2
Example Stimuli From the Assessment of Contextualized Emotions-Faces (ACE-Faces) Task



individual difference measures described below.[6] Basic psychometric properties of the scales are presented in online Supplemental Materials S2. In terms of securing power, we estimated power based on an ordinary least square (OLS) power analysis calculator, according to which power for a small effect ($f2$ = .15) with three predictors, N = 98, and α = .05 would be .90.

Materials and Procedure

Participants completed a battery of personality tests (see online Supplemental Materials S2 for a complete list) online in the days before the study. Participants completed the ACE-Faces (Hess et al., 2016), the Faces section of the MSCEIT (Mayer et al., 2003), the Experiences in Close Relationships Questionnaire (Fraley et al., 2000), the Self-construal scale (Singelis, 1994), the positive and negative affect scale (Watson et al., 1988), the Big-Five inventory (BFI-K; Rammstedt & John, 2005), the Toronto Alexithymia scale (Kupfer et al., 2001), the Wong and Law Emotional Intelligence Scale (Wong & Law, 2002), the Diener et al. (2010) psychological well-being scale.

Results

ACE Inaccuracy was negatively correlated with hit rates, $r(154) = -.45$, $p < .001$, and positively with ACE accuracy scores, $r(154) = .38$, $p < .001$. ACE accuracy was positively correlated with hit rates, $r(154) = .38$, $p < .001$. Results from multiple regressions that regressed personality traits on the three EDA scores (see Tables 4 and 5) revealed several emotion and relationship-related personality characteristics to be meaningfully related to accuracy and inaccuracy over and above the possible effects of standard assessment in terms of hit rates. Accuracy was a unique positive predictor of: other appraisal of emotion ($\beta = .26$, $t = 2.33$, $p < .05$), the MSCEIT-Faces scores ($\beta = .27$, $t = 2.63$, $p < .05$), and levels of well-being ($\beta = .23$, $t = 1.99$, $p < .05$), and a unique negative predictor of: anxious attachment ($\beta = -.29$, $t = -2.58$, $p < .05$), alexithymia ($\beta = -.30$, $t = -2.62$, $p < .05$), and loneliness ($\beta = -.25$, $t = -1.85$, $p < .05$). Accuracy was also positively related, at nonsignificant level, to use of emotion ($\beta = .21$, $t = 1.84$, $p < .07$), and independent self-construal ($\beta = .20$, $t = 1.71$, $p < .08$). Inaccuracy was a unique positive predictor of: anxious and avoidant attachment ($\beta = .25$, and $\beta = .26$, $t = 2.11$, $t = 2.17$, $p < .05$, respectively), alexithymia ($\beta = .42$, $t = 3.59$, $p < .001$), and loneliness ($\beta = .41$, $t = 2.19$, $p < .01$), and a unique negative predictor of: self-emotion appraisal ($\beta = -.39$, $t = -3.29$, $p < .01$), other emotional appraisal ($\beta = -.44$, $t = -3.79$, $p < .01$), use of emotion ($\beta = -.36$, $t = -3.08$, $p < .01$), control of emotion ($\beta = -.24$, $t = -2.03$, $p < .05$), independent self-construal ($\beta = -.31$, $t = -2.56$, $p < .05$), MSCEIT-faces ($\beta = -.68$, $t = -6.38$, $p < .001$), and wellbeing ($\beta = -.34$, $t = -2.82$, $p < .01$).

Hit rates were positively associated with accuracy ($r(154) = .38$, $p < .01$) and negatively with inaccuracy ($r(154) = -.45$, $p < .001$), yet results from the multiple regressions suggested that the two indices tapped different emotion decoding processes; as in the

[6] In some cases, participants had already completed the questionnaires that had been provided by the research assistants or in class.

Table 2
Correlations Between ACE-Cartoon Accuracy and Inaccuracy With Personality Characteristics

Study	Avoid.	Anx.	Reap.	Sup.	Indep.	Intr.	Asian	NA	PA	Extra	Agrbl.	Open.	Conc.	Emstb.	Sanx	Amb	SEA	OEA	ROE	UOE	Msceit-f	Alone
										Accuracy												
Study 2	−0.06	−0.04	0.03	−0.08	0.08	0.04	0.10	0.01	0.12	0.13	0.05	0.10	0.09	0.01	−0.01	−0.01	0.03	0.05	0.03	0.12	0.05	
Study 3	−0.15	−0.06	0.44	−0.12	0.21	−0.05	0.03			0.04	0.03	0.03	0.02	−0.14	−0.01	−0.20	0.15	0.11	0.01	0.13		
Study 4	−0.03	0.11			−0.01	0.17		−0.02	−0.04													
Study 5	0.09	0.08	0.20	0.01	−0.07	0.14	0.11	−0.01	0.04	−0.05	−0.07	−0.01	0.12	0.05								−0.22
Study 6	−0.45	−0.15	0.16	−0.12	−0.15	0.32	−0.01	−0.21	0.08	0.12	0.29	0.01	−0.37	−0.35								−0.08
M rz	−0.12	−0.01	0.21	−0.08	0.01	0.13	0.06	−0.06	0.05	0.06	0.08	0.03	−0.03	−0.11	−0.01	−0.11	0.09	0.08	0.02	0.13	0.05	−0.15
Comb Z	−2.85	−0.29	4.46	−1.65	0.29	2.98	1.26	−1.28	1.09	1.34	1.67	0.74	−0.76	−2.39	−0.17	−1.81	1.54	1.40	0.35	2.13	0.70	−1.98
p-value	0.00	0.38	0.00	0.05	0.39	0.00	0.10	0.10	0.14	0.09	0.05	0.23	0.23	0.01	0.43	0.04	0.06	0.08	0.36	0.02	0.24	0.02
										Inaccuracy												
Study 2	0.20	0.11	−0.09	0.13	−0.02	0.10	0.07	0.37	0.17	−0.20	−0.01	−0.09	0.01	−0.03	0.08	0.16	−0.07	0.14	0.05	0.12	−0.46	
Study 3	−0.11	−0.01	−0.02	0.08	0.05	0.08	0.15			−0.01	0.01	0.04	0.08	0.04	−0.04	−0.01	0.10	0.03	−0.04	0.14		
Study 4	0.20	0.01			0.07	−0.06		0.30	0.11													
Study 5	0.13	0.27	−0.06	−0.10	−0.06	0.10	0.10	0.33	0.11	−0.01	−0.20	−0.03	0.06	0.24								−0.19
Study 6	0.16	0.18	−0.19	−0.04	−0.09	0.01	0.26	−0.13	−0.01	0.03	0.04	0.14	−0.05	−0.05								0.14
M rz	0.12	0.11	−0.09	0.02	−0.01	0.05	0.15	0.22	0.09	−0.05	−0.04	0.01	0.03	0.05	0.02	0.08	0.02	0.09	0.01	0.13	−0.46	−0.02
Comb Z	2.78	2.65	−1.94	0.38	−0.24	1.10	3.16	4.81	2.08	−1.04	−0.93	0.32	0.56	1.09	0.32	1.28	0.26	1.45	0.09	2.22	−6.73	−0.30
p-value	0.00	0.00	0.03	0.35	0.40	0.14	0.00	0.00	0.02	0.15	0.18	0.37	0.29	0.14	0.37	0.10	0.40	0.07	0.47	0.01	0.00	0.38

Note. ACE = Assessment of Contextualized Emotions; M rz = weighted mean correlation (Fisher's *z* transformed). M r = weighted mean correlation (converted from rz to r). Sex = 1 – male, 2 – female. Avoid. = avoidant attachment; Anx. = anxious attachment; Reap. = emotion reappraisal; Sup = emotion suppression; Intr. = interdependent self-construal; Indep. = independent self-construal; Asian = Asian cultural construal; NA = Negative affect; PA = Positive affect; Extra = extraversion; Agrbl. = agreeableness; Open. = openness; Consc. = conscientiousness; EmStbl. = emotional stability; Amb. = ambivalence; SEA = self-emotion appraisal; OEA = other emotion appraisal; ROE = regulation of emotion; UOE = use of emotion; MSCEIT-F: Mayer, Salovey, Caruso Emotional Intelligence test Faces part; Alone = loneliness.

Table 3
Results From Multiple Regression Analyses Regressing Personality Traits on the Three Emotion Perception Indices Studies 1–5 (ACE-Cartoons)

Predictors	Avoid.	Reap.	Supp.	Indep.	Intr.	Extra.	Agrbl.	Consc.	Open.	EmStb.	PA	Na
Intercept	3.039	4.73 [3.39, 5.10]	4.25 [3.30, 5.19]	4.36 [3.92, 4.82]	4.61 [4.09 – 5.12]	−.83 [−1.61, −.054]	−1.152 [−1.85, −.45]	−1.24 [−1.95, −.53]	−1.16 [−1.83, −.49]	−.46 [−1.25, .33]	3.30 [2.78, 3.82]	1.46 [.99, 1.93]
Accuracy	−.09† [−.20, .003]	.12* [.012, .289]	−.13* [−.34, −.032]	.11* [.010, .15]	.07 [−.01, .17]	.13* [−1.61, −.05]	.13* [.023, .25]	.15** [.31, .65	.14** [.04, .25]	−.02 [−.15, .11]	.06 [−.034, .126]	−.05 [−.11, .04]
Inaccuracy	.15** [.08, .33]	−.10† [−.343, .003]	.02 [−.16, .23]	−.022 [−.102, .062]	−.091* [−.19, .01]	−.015 [−.18, .14]	.09 [−.023, .26]	.13** [.04, .33]	.09 [−.02, .25]	.13* [.04, .36]	−.12* [−.21, −.02]	.21*** [.11, .28]
Hit rate	.03 [−.33, .64]	.06 [−.298, .98]	−.001 [−.71, .70]	−.076 [−.58, .063]	−.03 [−.48, .25]	.03 [−.41, .74]	.08 [−.15, .90]	−.05 [−.80, .27]	.10 [−.06, .94]	.06 [−.26, .92]	−.09 [−.74, .04]	−.08 [−.63, .064]
F	4.063**	4.73 **	2.49†	1.90	1.56	3.27*	6.16***	8.15***	7.58***	2.21†	2.04	10.31
R^2	.021	.03	.016	.01	.01	.02	.04	.05	.05	.014	.013	.063
df	3,559	3,455	3,455	3,559	3,559	3,454	3,454	3,454	3,454	3,454	3,461	3,461

Note. ACE = Assessment of Contextualized Emotions; Avoid. = avoidant attachment; Reap. = emotion reappraisal; Supp. = emotion suppression; Intr. = interdependent self-construal; Indep. = independent self-construal; NA = Negative affect; PA = Positive affect; Extra = extraversion; Agrbl. = agreeableness; Open. = openness; Consc. = conscientiousness; EmStb. = emotional stability. 95% confidence intervals in brackets.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

previous studies, hit rates did not explain any of the variance in personality traits, with the exception of independent self-construal (β = −.25, t = −2.11, $p < .05$) and MSCEIT-Faces (β = −.21, t = −1.99, $p < .05$). Including the MSCEIT-Faces in those analyses did not return any significant results and did not meaningfully alter the observed association with accuracy. For anxious and avoidant attachment, loneliness, and NA initially significant ACE-inaccuracy coefficients became nonsignificant when MSCEIT-Faces scores was included.

Discussion

Overall, using real contextualized facial emotion, we found that calculating accuracy and inaccuracy scores and using a socially engaging task allows us to isolate the part of the variance in emotion recognition that is related to personality constructs. As in the previous studies, accuracy and inaccuracy in ACE-Faces was consistently associated with personality characteristics that tap the social domain (attachment orientations, emotion regulation strategies, cultural self-construal, self-reported emotional intelligence, loneliness, alexithymia, and well-being) and in many of those associations there were unique effects of accuracy and inaccuracy. As in Studies 1–5, there were some, albeit weak, correlations with the Big Five characteristics. These results will be outlined further in the General Discussion section.

Notably, even though hit rates and inaccuracy scores consistently correlated negatively, the hit rates themselves were not consistently related to personality constructs, whereas inaccuracy scores were. It is also noteworthy that the Faces part of the MSCEIT—a common test of emotion recognition accuracy in the framework of emotional intelligence—was correlated with accuracy scores but did not share the same relationship with personality. The MSCEIT-Faces was overwhelmingly related to ACE-inaccuracy and part of this common variance suppressed ACE inaccuracy (but not ACE-accuracy) relationships with some personality traits. It seems that the faces part of the MSCEIT, which is scored on a consensus base, captures biases that are socially shared rather than those that are due to differences in personality and some of those biases can be observed in ACE-inaccuracy and in its associations to some personality traits. As such, the use of the MSCEIT-Faces seems an interesting adjunct to the use of the ACE and can point to the cognitive make-up of the two ACE indicators.

Study 7

Given the predictive power of the ACE, it seemed pertinent to create a short version that can be used in larger studies where the ability to recognize emotions may be an important, but not central, aspect of the research. For this, we created the ACE-short. Based on research from our laboratory, we selected the items for which test–retest reliably was highest. These items do not allow separate assessments for different emotions but only the calculation of a global score. In Study 7a we used the ACE short with a large sample of participants who also completed a battery of personality scales. A subset of the participants completed the task twice (Study 7b). In this study, the ACE-short and the personality tests were presented online.

Table 4
Results From Multiple Regression Analyses Regressing Personality Traits on the Three Emotion Perception Indices Study 7 (ACE-Faces)

Predictors	Anxiety	Avoidance	WLSEA	WLOAE	WLUOE	WLROE	Tastot	Alone	Wbeing
Intercept	3.18 [1.82 – 4.55]	2.25 [.62 – 3.89]	5.91 [4.48 – 7.32]	5.50 [4.31 – 6.69]	5.66 [4.49 – 6.83]	5.48 [4.20 – 6.76]	2.12 [1.43–2.81]	1.72 [.90 – 2.54]	5.73 [4.55 – 6.92]
Accuracy	−.29* [−.45, −.06]	−.07 [−.30, .15]	.17 [−.06, .39]	.26* [.04, .48]	.21† [−.02, .43]	.07 [−.16, .29]	−.30* [−.51, −.07]	−.25* [−.51, −.01]	.23* [.01, .44]
Inaccuracy	.25* [.02, .43]	.26* [.02, .49]	−.39** [−.62, −.15]	−.44*** [−.67, −.21]	−.36** [−.59, −.13]	−.24* [−.48, −.01]	.42*** [.19, .65]	.41** [.15, .67]	−.34** [−.55, −.10]
Hit rate	.06 [−.15, .26]	.04 [−.20, .27]	−.15 [−.37, .09]	−.17 [−.40, .06]	−.14 [−.37, .09]	−.03 [−.26, .21]	.19 [−.05, .41]	.15 [−.10, .41]	−.14 [−.35, .10]
F	3.71*	2.51†	4.34**	5.67**	3.69*	2.27†	5.10**	3.94*	3.22*
R^2	.07	.05	.08	.10	.07	.045	.10	.09	.06
df	3,146	3,146	3,146	3,146	3,146	3,146	3,146	3,127	3,146

Note. ACE = Assessment of Contextualized Emotions; Anxiety = anxious attachment; Avoidance = avoidant attachment; WLSEA = Wong and Law Self Emotion Appraisal; WLOAE = Wong and Law Other Emotion Appraisal' WLUOE = Wong and Law Use of Emotion; WLROE = Wong and Law Regulation of Emotion; Alone = loneliness; Tastot = alexithymia; Wbeing = Well-being.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Method

Participants

Five hundred and seventy participants were recruited using an online survey located at the University of Crete. Of these, 525 (258 men) completed all main study questionnaires and their scores were retained for analysis. We excluded responses by two respondents aged 16 and one missing case hence the final sample consisted of 522 participants (age range 18–56, M_{age} = 21.98, *SD* = 6.60). Participants were informed that the aim of the study is to assess how people perceive emotions and that anonymity was guaranteed. The survey included a battery of individual difference measures described below.[7] Fifty-eight participants (24 men, 34 women, age range 18–24, M_{age} = 20.52, *SD* = 1.64) repeated the survey 1 month later (Time 2, Study 7b) in the laboratory. Participant characteristics are presented in Table 1.

Materials and Procedure

Participants completed an online a battery of personality scales and tests (see online Supplemental Materials S2 for a complete list) that included: the ACE-Faces short version, the Faces section of the MSCEIT (Mayer et al., 2003), the self-construal scale (Singelis, 1994), the Big-Five inventory (Rammstedt & John, 2005), the Toronto Alexithymia Scale (Taylor et al., 1985), adult attachment (Fraley et al., 2000), emotion regulation (John & Gross, 2004), a short loneliness scale (Hughes et al., 2004), the PANAS (Watson et al., 1988), the Rosenberg self-esteem scale (Rosenberg, 1965), and the MacArthur scale of Subjective Social Status (Adler et al., 2000). Basic psychometric properties of the scales are presented in online Supplemental Materials S2.

Results

ACE Inaccuracy was negatively correlated with hit rates, $r(522) = -.49$, $p < .001$, and the faces part of the MSCEIT, $r(522) = -.70$, $p < .001$, and positively with ACE accuracy scores, $r(522) = .33$, $p < .001$. ACE accuracy was positively correlated with hit rates, $r(522) = .28$, $p < .001$, and negatively with the MSCEIT faces, $r(522) = -.16$, $p < .01$.

Results from multiple regressions (see Table 6) revealed several emotion and relationship-related personality characteristics that were meaningfully and independently related to accuracy and inaccuracy. ACE accuracy positively predicted the MSCEIT-Faces scores ($\beta = .08$, $t = 1.95$, $p = .05$) and negatively predicted neuroticism ($\beta = -.12$, $t = -2.17$, $p < .05$), openness ($\beta = -.12$, $t = -2.16$, $p < .05$), and alexithymia ($\beta = -.10$, $t = -1.86$, $p = .06$). ACE inaccuracy negatively predicted MSCEIT-Faces scores ($\beta = -.72$, $t = -16.51$, $p < .001$) and was a positive predictor of interdependent self-construal ($\beta = .14$, $t = 2.33$, $p < .05$), higher subjective social status ($\beta = .15$, $t = 2.42$, $p < .01$), loneliness ($\beta = .20$, $t = 3.32$, $p < .01$) and positive affect ($\beta = .13$, $t = 2.20$, $p < .05$). As in the previous studies, accuracy and inaccuracy in the ACE-Faces short task were uniquely associated with several of the personality traits over and above the possible effects of standard assessment in terms of hit rates. Hit rates were positively associated with reported loneliness ($\beta = .18$, $t = 3.08$, $p < .001$) and negatively with positive affect ($\beta = -.14$, $t = -2.40$, $p = .017$), but were not a significant predictor for all other personality traits.

Table 5
Results From Multiple Regression Analyses Regressing Personality Traits on the Three Emotion Perception Indices Study 7 (ACE-Faces)

Predictor	Indep.	MSCEIT-F	NA	Extra.	Consc.	Neur.	Open.	Agrbl.
Intercept	3.93 [3.29 – 4.56]	76.53 [63.06 – 90.01]	1.53 [.63 – 2.42]	2.85 [1.45 – 4.25]	3.63 [2.38 – 4.88]	2.99 [1.61 – 4.38]	3.08 [1.74 – 4.41]	3.07 [1.97 – 4.17]
Accuracy	.20† [−.02–.29]	.27* [.07, .48]	.01 [−.20, .21]	.21† [−.02, .635]	.16 [−.06, .32]	−.06 [−.25, .15]	.19† [−.02, .29]	.12 [−.09, .26]
Inaccuracy	−.31* [−.52 - −.07]	−.68*** [−.90, −.48]	.22† [−.01, .42]	−.19 [−.35, .04]	−.23† [−.38, .01]	.11 [−.11, .30]	−.17 [−.29, .05]	−.18 [−.32, .04]
Hit rate	−.25* [−1.61 - −.05]	−.21* [−.42, −.01]	−.05 [−.26, .16]	−.06 [−.24, .14]	−.10 [−.28, .11]	.05 [−.16, .25]	.02 [−.15, .18]	.05 [−.15, .21]
F	2.26	17.48***	3.41*	1.71	1.43	.27	2.48†	2.31†
R^2	.05	.27	.07	.03	.03	.01	.05	.05
df	3,146	3,146	3,146	3,146	3,146	3,146	3,146	3,146

Note. ACE = Assessment of Contextualized Emotions; Anxiety = anxious attachment; Avoid. = avoidant attachment; WLSEA = Wong and Law Self Emotion Appraisal; WLOAE = Wong and Law Other Emotion Appraisal' WLUOE = Wong and Law Use of Emotion; WLROE = Wong and Law Regulation of Emotion; Intr. = interdependent self-construal; Indep. = independent self-construal; NA = Negative affect; Extra. = extraversion; Agrbl. = agreeableness; Open. = openness; Consc. = conscientiousness; MSCEIT-F = Mayer, Salovey, Caruso Emotional Intelligence test Faces part; Alone = loneliness; Tastot = alexithymia.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Including the MSCEIT-Faces in those analyses did not return any significant results for MSCEIT-Faces and did not meaningfully alter the observed association. For PA only, MSCEIT-Faces was found a significant predictor ($\beta = -.13$, $t = -2.60$, $p < .05$) and adding MSCEIT-Faces rendered the initially significant ACE-inaccuracy score nonsignificant.

ACE-Faces Short Test–Retest Results

Zero-order correlations suggested good test–retest reliability ($r(58) = .58$, $p < .001$ and $r(58) = .74$, $p < .001$ for accuracy and inaccuracy, respectively). Online Supplemental Materials Table S2 presents results from zero-order correlations between the main variables.

Discussion

In this online study, a shorter version of the ACE-faces was meaningfully related with several interpersonal personality traits over and above hit scores ratings and a popular measure of nonverbal emotion perception (MSCEIT-faces). The ACE-faces short showed satisfactory internal and test–retest reliability. As in the previous studies, hit rates did not predict personality trait scores over and above the ACE-Faces (short) accuracy and inaccuracy scores.

General Discussion

For many years, the study of EDA used a restricted notion of accuracy. Accuracy was understood as the opposite of inaccuracy in detecting emotion expressions in context-less single faces and was operationalized by calculating accuracy in terms of hit rates in the emotion assessments (i.e., the times each specific emotion label corresponded to the criterion established for that label). Relationships with personality traits were limited, and at best, inconsistent (Elfenbein et al., 2002). This approach, however, neglected social context in both the assessment of EDA (Mumenthaler & Sander, 2012) and in how personality was understood (Mischel & Shoda, 1995). The present studies suggest that when infusing social context in EDA, consistent and meaningful relationships with personality traits, especially those that tap the social domain, arise.

Personality and Emotion Recognition Accuracy and Inaccuracy

Results from seven studies in two labs situated in Greece and in Germany that utilized a novel model and method that infuses social context in emotion decoding and distinguishes between accuracy (perceiving the intended emotions) and inaccuracy (perceiving additional emotions to those expressed), suggest that accuracy and inaccuracy ratings are consistently related to personality traits that tap the social domain. In a meta-analysis of five studies using a cartoon-based ACE-Cartoons accuracy predicted higher and inaccuracy predicted lower emotion reappraisal (a finding also partly observed in Study 7a) and accuracy was associated with lower suppression. This is in line with research that considers emotion perception as antecedent to emotion regulation strategies, suppression in particular (Bebko et al., 2011); yet, this is, to our knowledge, the first time that a specific connection between emotion regulation strategies and EDA has been established.

Table 6
Study 7a (ACE-Short) Greece

Predictor	Interd.	Neuroticism	Openness	PA	MSCEIT-F	SSS	Alone	TAS
Intercept	4.34 [3.97, 4.72]	3.48 [2.91, 4.05]	2.87 [2.53, 3.22]	3.06 [2.69, 3.42]	52.72 [49.99, 55.44]	5.13 [4.37, 5.89]	1.17 [.81, 1.38]	3.61 [3.32 – 3.91]
Accuracy	−.06 [−.15, .04]	−.12* [−.27, .014]	−.12* [−.19, −.01]	.04 [−.06, .13]	.08† [−.01, 1.42]	−.01 [−.20, .20]	−.04 [−.10, .05]	−.10† [−.13−.004]
Inaccuracy	.14* [.02, .30]	.09 [−.05, .31]	.02 [−.09, .16]	.13* [.02, .28]	−.71*** [−9.29, −7.32]	.15** [.06, .62]	.20** [.07, .27]	.04 [−.06−.12]
Hit rate	.09 [−.13, 1.04]	.12* [.015, 1.55]	.11† [−.05, 1.03]	−.14* [−1.26, −.13]	−.01 [−4.49, 4.01]	.06 [−.61, 1.79]	.18** [.25, 1.12]	.028 [−.30−.49]
SSS		−.11* [−.13, −.012]						−.20*** [−.10 - −.04]
F	1.83	2.84*	2.30†	10.13***	162.26***	2.93*	5.18**	6.47***
R^2	.01	.02	.01	.05	.48	.024	.03	.05
df	3,517	4,487	3,518	3,516	3,518	3,488	3,518	4,487

Note. ACE = Assessment of Contextualized Emotions; Interd. = interdependent self-construal; SSS = Subjective Social Status; Alone = loneliness; PA = Positive affect; MSCEIT-F = Mayer, Salovey, Caruso Emotional Intelligence test Faces part; TAS = Toronto Alexithymia Scale.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Avoidant and anxious attachment orientations, two key interpersonal personality traits, were consistent predictors of inaccuracy in the ACE-Cartoons (meta-analysis of Studies 1–5), the ACE-Faces (Study 6) suggesting strong decoding biases. Anxious attachment was also negatively related to accuracy in ACE-Faces (Study 6) suggesting that higher levels of this insecure attachment orientation may involve both less accuracy and more inaccuracy in EDA. In the case of avoidant attachment orientation, only the latter, inaccuracy processes seem to be present. The processes associated with insecure attachment that are responsible for lower rates in the identification of the expressed emotion (lower accuracy), and the identification of more secondary emotions (higher inaccuracy) are worthy of further investigation. These same processes may also be responsible for the weak and inconsistent findings in previous attachment differences research involving different EDA methods (Chris Fraley et al., 2006; Kafetsios et al., 2014). Namely, different methods and samples may partly tap higher attachment anxiety associations with lower accuracy, the ability to correctly infer the intended emotion, and higher inaccuracy, the tendency to perceive emotions additional to those expressed.

In all reported studies, both ACE accuracy and inaccuracy were positively related to interdependent self-construal and Asian social values. This finding, at first, may seem counterintuitive. However, this result also paints a picture of chronic social orientation as a socially-malleable personality characteristic, which, under certain circumstances, can involve both lower emotion decoding accuracy (Kafetsios & Hess, 2013) and higher communal orientation, attending to others (Cross et al., 2000) and higher EDA as a consequence. Lastly, in two of our studies using the ACE-Faces task (Studies 6 and 7) accuracy was positively associated with well-being and in three studies (Studies 1, 2, and 6) accuracy was negatively associated with loneliness suggesting that accuracy and inaccuracy are associated with real-life personality-related outcomes.

The present studies also returned evidence connecting accuracy and inaccuracy in the ACE with EI both as an ability and as a self-reported competence, evidence that is distinctly missing from the EI literature (Austin, 2005; Farrelly & Austin, 2007). Accuracy in ACE-Faces (Study 6) was associated with higher scores in self-reported emotion perception and using emotion (Wong & Law, 2002), whereas ACE-Faces inaccuracy was associated with lower scores in all four self-reported EI capabilities. Notably, scores on the Faces subscale of the MSCEIT (Mayer et al., 2003) were strongly related to ACE inaccuracy—but not ACE accuracy, suggesting that the Faces branch of the MSCEIT reflects culturally shared biases. The faces part of the MSCEIT did not predict personality traits, suggesting that these cognitive measures do not assess the same proximal emotion decoding ability relevant for personality as does the ACE. Yet, evidence that part of the variance between the Faces part of the MSCEIT overlapped with ACE inaccuracy (but not with ACE accuracy) and that this covariance was responsible for suppressing ACE-inaccuracy relationships with some personality traits provide some indication regarding the different cognitive biases associated with the two ACE indicators, which can be taken up by further research.

Contextualized/Situated Abilities and Personality

Taken together, these findings provide strong support for a contextualized view of emotion decoding abilities and links with

personality traits and their behavioral outcomes. EDA research rarely took a situational stand to assessing emotion decoding accuracy, whereas the present studies strongly suggest that situating emotion recognition processes brings about meaningful and consistent relationships with personality traits. Such a contextualized approach to EDA is in line with the Cognitive-Affective Processing System (CAPS) model of personality (Zayas et al., 2002) among others (e.g., Funder, 2016; Tett & Guterman, 2000) regarding relationships between EDA and personality traits. In line with the CAPS model, our results point to the notion that personality characteristics, especially those that tap the social domain (interpersonal, social characteristics) consistently relate to emotion decoding accuracy of contextualized emotion expressions since the ACE provides a much richer context for emotion decoding. Further research on the topic is needed to unveil how, exactly, contextual EDA and prosocial personality traits coincide.

Hit Rates versus Dimensional Assessment of EDA

Beyond associations with personality traits, a central question tested in all studies was whether a traditional hit rates approach—associating one (correct) label to a single emotion expression—will provide the same information as a contextualized assessment of emotions that involved different emotional ratings of both accuracy and inaccuracy. Across all studies, the assessment of accuracy and inaccuracy in a contextualized assessment of emotion was superior to simple hit rates in relating to personality traits.

Notably, EDA relationships with personality characteristics were not equally strong across all reported studies. Studies 1–5 and 7 took place in Greece and in those studies, personality was less strongly related to ACE accuracy and bias. The difference observed with results using the ACE in Germany supports the notion that personality constructs relate less strongly to emotional constructs in more collectivistic societies (Kafetsios, 2021). Further research is needed in independent and more interdependent cultures to determine the relative effects of personality on ERA using the ACE model.

Accuracy and Bias Models

The specific approach to EDA promoted in this paper also constitutes a conceptual contribution to models of social and emotional perception. The present research provides further evidence to existing work (Hess et al., 2016; Kafetsios & Hess, 2019) that the accurate perception of the emotional signal versus the inaccurate perception of secondary emotions (inaccuracy) in the ACE constitute two independent indices of EDA. Across studies, accuracy and inaccuracy tended to be associated, in theoretically meaningful ways, with different personality traits. This is strong evidence in line with conceptual arguments that accuracy and inaccuracy in emotion perception are theoretically distinct processes (Funder, 1995) and that accuracy and inaccuracy/bias in social perception constitute two nonexclusive dimensions (West & Kenny, 2011; Zaki & Ochsner, 2011b). Such an approach also promotes a view of accuracy in terms of its utility for social emotion perception and its adaptive value (Kruglanski, 1989).

The introduction of context in emotion perception and a dimensional assessment of emotion expressions allowed to connect research on emotion perception accuracy with social cognition research (Zaki & Ochsner, 2011b). One of the challenges for EDA research has been the failure to tap the motivation to attend to stimuli (Ickes, 1993). However, the ACE approach may provide an appropriate environment for assessing motivation to attend to emotion expressions by including competing cognitive tasks that can gauge perceivers' attention: (a) pitting context versus focal facial expressions and (b) rating a range of depicted as well as secondary emotions. Another distinctive feature of the stimuli is their low intensity. Recent research suggests that lower rather than higher intensity is predictive of accuracy (Israelashvili et al., 2019).

Taken together, the model and method presented in this paper, promote accuracy as a measure of social engagement that could be taken up by further research. For example, future work could specifically address how shifts in accuracy result from alterations in social context (Zaki & Ochsner, 2011a) by examining how perceivers' social knowledge and attributions to the social context can influence decoding accuracy and inaccuracy.

Limitations and Future Research

One main limitation of the current research rests with how the personality traits were assessed. Self-report assessments of personality traits involve several key limitations, that render them as less desirable ways to assess constancy in personality characteristics (Paulhus & Vazire, 2007). Moreover, using a short version of the BF resulted in expected low internal consistency estimates for some of the personality traits. In order that relationships between the BF and EDA accuracy and inaccuracy can be more accurately and reliably assessed, future research could consider multitrait multimethod approaches and a cross-situational assessment of personality traits (Horstmann & Ziegler, 2020), especially of traits that tap the social domain.

Inherent in the ACE are contextual cues (in ACE-faces targets and persons in the periphery express the same or different emotions, in ACE-Cartoons there is the addition of group facing to the target or the perceiver) elements that allow the simulation of social context. The current studies adopted a summative assessment of their influence on accuracy and inaccuracy. Future research could adopt more elaborate analytic frames (e.g., social computational models; Ong et al., 2019) to decompose the influence of likely sources of bias inherent in the ACE task (i.e., congruent vs. incongruent emotions, group facing inward or toward the perceiver) on the summative accuracy and inaccuracy rates and their relationships with personality characteristics of the perceiver. Such an approach would greatly enhance understanding of process—outcome relationships in EDA (Zaki & Ochsner, 2011b).

Conclusion

A series of laboratory and online studies, which used a contextualized model and method of EDA documented that personality traits that tap the social domain were consistently and meaningfully related to accuracy and inaccuracy in emotion perception. Accuracy and inaccuracy captured different facets of these personality traits and, in some cases, simultaneously. Results from these studies starkly contrast with findings for the traditionally used hit rates approach and further support the notion that emotion recognition, which is a social act (Fischer et al., 2019) should be studied

in a social context. The same applies to personality traits (Zayas et al., 2002) as predictors of EDA. Only such a contextualized assessment of emotion recognition ability can reveal the long presumed, but rarely demonstrated, association between personality traits and emotion recognition ability.

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