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Perceiving Affective Content in Ambiguous Visual Stimuli: A Component of Emotional Intelligence

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Emotional intelligence involves the accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living. One aspect of emotional intelligence is the ability to recognize the consensually agreed upon emotional qualities of objects in the environment. One hundred thirty-nine adults viewed 18 reproductions of faces, color swatches, and abstract designs and rated the emotional content of these visual stimuli. Three scores were extracted, including consensual accuracy, amount, and range of emotion perceived. These scores were compared with other aspects of emotional intelligence such as empathy and related to constructs such as alexithymia and neuroticism. A general ability to perceive consensual emotional content in visual stimuli was found, and it was most strongly associated with the ability to respond empathically to others.

One tradition in psychology has viewed emotional and logical thought as inimical to one another (Woodworth, 1940). In this view, emotion is seen as disrupting, misdirecting, and generally interfering with attempts to function rationally in the world. A competing tradition, however, has viewed emotional thought as a part of, and a contributor to, logical thought and to intelligence in general (Leeper, 1948). This latter tradition sometimes refers to emotional intelligence, a type of emotional information processing that includes accurate appraisal of emotions in oneself and others, appropriate expression of emotion, and adaptive regulation of emotion in such a way as to enhance living (Salovey

& Mayer, in press). According to the emotional–intelligence perspective, one who possesses these abilities is considered a well-adjusted, emotionally skilled individual; one who does not may well be impaired in emotional and social functioning. Our study examined people's abilities to recognize emotional content in faces, colors, and abstract designs, and related it to their abilities to empathize with others in order to learn more about the role of people's abilities to identify and communicate about basic human emotions.

There is strong evidence that the face is the primary signal system for showing the emotions. Recognition of facial expressions of affect appear universal and are related to emotional expression (Ekman, Friesen, & Ancoli, 1980). People are not usually taught how to read these facial signals; instead, they are assumed to know them. And yet, individual differences may exist in such knowledge. There is evidence, in fact, that youths with legal and social difficulties have often failed to acquire such skills of emotional perception (McCown, Johnson, & Austin, 1986).

People, however, receive emotion not only from faces but from other visual stimuli as well. For example, the field of aesthetics, in part, studies how people extract emotions from paintings, photographs, and other forms of art, as well as the fact that peoples' skills vary in this regard (Barten, 1983). Color responses on the Rorschach test are believed to be indicators of emotional lability, and contemporary research on the Rorschach supports that interpretation (Exner, 1974, 1978; Exner & Weiner, 1982). Few studies, however, have directly examined the ability to recognize emotional content in color. For instance, what do the colors blue or red indicate emotionally? Much of the same can be said for designs. Works of art are often created to express specific emotional feelings. For this reason, the ability to recognize these emotional elements could also be a part of understanding nonverbal emotional communication (Rosenhan & Messick, 1966).

PREVIOUS RESEARCH

Identifying the affective content of ambiguous stimuli may be one aspect of the ability to process incoming emotion-laden information. A number of techniques have been designed to measure emotion-receiving ability, including the Affective Sensitivity Test (AS; Campbell, Kagan, & Krathwohl, 1971; Kagan, 1978), the Brief Affect Recognition Test (BART; Ekman & Friesen, 1974), the Communication of Affect Receiving Ability Test (CARAT; Buck, 1976), the Profile of Nonverbal Sensitivity (PONS; Rosenthal, Hall, DiMatteo, Rodgers, & Archer, 1979), and the Social Interpretation Task (SIT; Archer & Akert, 1977). These measures are based upon the notion that emotion-receiving ability includes the skill of an individual at decoding the states of others using visual or other nonverbal cues. In a review of these measures, Buck (1984) noted that they

share several problems of reliability and validity, often undermining their utility.

Problems of reliability and validity of the scales may be due, in part, to the fact that developers of the scales concentrated on the properties of the stimuli, rather than on measurement of participants' responses. Typically, great care was taken to prepare the nonverbal stimuli and much less time was paid to designing a reliable form of measurement of the participants' responses. For example, in the SIT test (Archer & Akert, 1977), participants view 20 videotaped scenes (each 30–60 sec long) and then answer one interpretive question about the people in each of the scenes. Another example is the PONS test (Rosenthal et al., 1979) in which participants view 220 instances of faces or voices that model 20 emotional responses. In each case, however, subjects rate only the degree to which either a dominance–submission or positive–negative quality prevailed in each model. Similarly, the AS (Campbell et al., 1971) consists of videotaped excerpts of actual counseling sessions. Participants were instructed to perceive whatever emotions the client in the videotape felt at the end of the counseling session and then, in one version of the test, select a multiple choice alternative that described the client's feelings. Other tests (e.g., the BART; Ekman & Friesen, 1974), include interesting yet complex operationalizations of emotional perception that make the tests harder to give in group settings (e.g., the necessity of a tachistoscope for administration). From a measurement standpoint, the collection of few subject responses or severely restricting participants' responses limits reliability. Measurement also may be improved by considering a wider range of affective stimuli; there are far more emotionally laden stimuli than faces.

CRITERION MEASURES

The ability to recognize emotional content of visual stimuli may be related to a variety of personality traits that have been identified with emotional intelligence (or a lack thereof)—empathy, alexithymia, and neuroticism. For example, to feel empathy, one must first accurately comprehend the emotional experiences of a person in need (Mehrabian & Epstein, 1970). In contrast, alexithymia is a proposed term for individuals who have extreme difficulty in recognizing and describing their own feelings (Taylor, 1984). Such individuals should have an impaired capacity for recognizing emotion in visual stimuli.

Neuroticism (Eysenck & Eysenck, 1968) is an important mood-related trait that may also be related to emotional perception (Mayer & Salovey, 1988). Because neurotics tend to be more emotionally labile, they may better recognize emotionality in others. They also may distort or intensify the emotions they perceive.

In our study, ability to detect visual emotional content was associated with

several dispositional variables. One hypothesis was that the human emotional perceptual system is a general system that is not preprogrammed to perceive affect only in stereotyped facial patterns, but can also evaluate the emotional content of novel colors and designs (Rosenhan & Messick, 1966). It was further hypothesized that accuracy in one domain of perception would be related to accuracy in others. Second, it was hypothesized that such ability would be related to several personality characteristics. People who can accurately perceive emotion should know their own emotions and be generally able to accept internal experience such as affective imagination and fantasies (Taylor, 1984). They should also be more emotionally expressive and have greater emotional empathy for others (Mehrabian & Epstein, 1970).

METHOD

Subjects

One hundred thirty-nine men and women participated in this study (ages ranged from 17 to 63 years). Subjects were recruited from undergraduate psychology and art classes, a law school, and an engineering firm. Eleven protocols were discarded because of recording errors.

Materials

The emotional perception questionnaire (Part I) consisted of 6 facial images, 6 colors, and 6 abstract designs, for a total of 18 visual stimuli to which participants were to respond.

The six female facial images were first photographed from Ekman and Friesen (1975) and then reproduced using an offset printing process. (Reference to exact pages and images are as follows: surprised—Figure 11–A, p. 45; fear—Figure 22–B, p. 62; disgust—Figure 30–B, p. 76; anger—Figure 42–A, p. 97; happy—Figure 50–B, p. 112; and sad—Figure D–lower right, p. 193; Ekman & Friesen, 1975.) These images represented the prototypical examples of the emotions happiness, sadness, anger, fear, surprise, and disgust. The six black-and-white abstract designs contained angular straight lines in two cases, curved lines in two cases, and both curved and straight lines in the final two cases. The colors selected were red, blue, green, yellow, black, and white. They were drawn using Spinks brand ink of the following shades: brick red, periwinkle blue, sea green, MS yellow, black, and white. Each face, color, and design was accompanied by 5-point rating scales representing the six primary emotions: happiness, sadness, anger, fear, surprise, and disgust (Ekman & Friesen, 1975).

Part II contained three criterion measures: (a) a 33-item scale of empathy

(Mehrabian & Epstein, 1970); (b) a 26-item, four-factor scale of alexithymia (Taylor, Ryan, & Bagby, 1985); and (c) a brief form of the Eysenck Personality Inventory (Eysenck, 1973), measuring neuroticism and extraversion.

Scoring of Measures

Consensus. For the purposes of this study, *consensus* was defined as the ability to perceive emotions that were consensually viewed as present, and the equally weighted ability to consensually agree when emotion was not present. A consensual response was one in which participants responded within 1 scale-point of the modal response on one of the six emotion scales for an item. For example, in response to the happy face, the modal response on the happy scale was 5 (definitely present), so a rating of 4 or 5 was considered a consensual response. Similarly, the modal response to the surprise scale in response to the happy face was 3, so any response from 2–4 was considered consensual. The remaining four emotion scales (Sad, Angry, Fear, and Disgust) all had modal responses of 1. Because scales with modal responses of 1 greatly outnumbered scales with modal responses of more than 1, some of the scales with modes of 1 were randomly deleted so that equal numbers of emotional and nonemotional scales within each item were scored. Thus, for example, on the happy face item, two scales with modal emotional responses of 1 were scored and two were deleted. This procedure maintained the counterbalancing of emotional and nonemotional scoring across the six different emotions, but reduced the likelihood that participants responding 1 on all scales would necessarily receive high consensus scores. Ultimately, nine stimuli were scored on two scales, six were scored on three scales, and one was scored on four scales. Three items (two designs and one color) had modal emotional responses of 1 (i.e., no emotion present) across the six emotion scales and were discarded. Each correct response on the balanced emotional and nonemotional scales was given 1 point.

Range. Range scores were designed to measure the range of a participant's responses and were calculated as the standard deviation of a subject's responses across all items.

Amplitude. Amplitude indicated the amount of total emotion that an individual saw in the 18 stimuli and was calculated as the mean scale response across all items.

Procedure

Participants were tested in groups of 1 to 20. Sessions lasted approximately 25 min.

RESULTS

Emotional Consensus Across Faces, Colors, and Designs

One important question was whether emotional consensus generalized across faces, colors, and designs. A principal components analysis was conducted on the consensus scores of the 15 items. The eigenvalues for this test strongly suggested a unifactorial solution. (Eigenvalues reached an immediate elbow after the first component: 2.5, vs. 1.4, 1.3, 1.2, etc.) The unrotated solution reported in Table 1 suggests there is one factor representing consensus across items. Thus, consensus in emotional perception appeared to generalize across the three stimulus domains.

Reliability of Scales

The coefficient alphas for each of the scores was calculated across the 15 items for which consensus was measured. This analysis yielded a reliability coefficient of $r(128) = .94$ for amplitude, $r(128) = .90$ for range, and $r(128) = .63$ for consensus. The reliability of consensus, although lower than the other scales, was still adequate to permit an examination of its validity in relation to the criterion variables.

TABLE 1
Results of Principal Components Analysis

	Factor Loadings
	1
Color (blue)	.60
Design (squiggle)	.54
Design (rope)	.54
Design (lightening)	.49
Color (red)	.47
Color (yellow)	.44
Face (anger)	.44
Color (black)	.42
Design (sea shell)	.38
Color (green)	.32
Face (happy)	.30
Face (sad)	.30
Face (fear)	.22
Face (disgust)	.27
Face (surprise)	.19

Correlational Analyses

Pearson correlations between emotion scores and the criterion variables were calculated and described in Table 2.[1] Consensus scores were of strongest theoretical interest and were significantly correlated with empathy, $r(128) = .33$, $p < .001$, and with extraversion, $r(128) = .15$, $p < .05$. Surprisingly, alexithymia, at least as measured by the Taylor scale, was associated with a greater emotional range, $r(128) = .16$, $p < .05$, and amplitude, $r(128) = .20$, $p < .01$, in response to the stimuli. This pattern was nearly identical to the one found for neuroticism with range, $r(128) = .23$, $p < .001$, and amplitude, $r(128) = .22$, $p < .01$. This is not surprising because alexithymia and neuroticism were intercorrelated, $r(128) = .34$, $p < .001$.

DISCUSSION

Our study examined characteristics of the perception of emotion in visual stimuli: its amplitude, range, and consensual quality. It had been initially hypothesized that the ability to perceive emotions reliably in a manner similar to that perceived by other people would be a component of emotional intelligence. Emotional intelligence was a general construct that described the ability to appraise and express emotions and use them for motivational and decision-making purposes (Salovey & Mayer, in press). One core aspect of emotional intelligence is that in healthy people, these skills are related. As predicted, the ability to extract emotional information from faces, colors, and even abstract designs, was related to empathy.

Empathy requires the accurate identification of the emotional responses of other people. The data reported here contribute to the theories that a person

[1]A MANOVA revealed no main effects for gender for any measures in this study.

TABLE 2
Pearson Correlations Between Emotional Perceptions and Criterion Measures

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
[1] Empathy	1.00						
[2] Alexithymia	.01	1.00					
[3] Neuroticism	.29**	.34**	1.00				
[4] Extraversion	.13	−.24**	−.30***	1.00			
[5] Consensus	.33***	.09	.13	.15*	1.00		
[6] Range	.01	.16*	.23***	.16*	.45***	1.00	
[7] Amplitude	−.14	.20**	.22**	−.09	.01	.22**	1.00

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

must accurately perceive emotions in others before empathy can take place (cf. Batson, 1987; Hoffman, 1984). Individuals who are unable to deduce that certain colors or ambiguous designs suggest consensually agreed upon feelings may be unlikely to feel empathy in more complex interpersonal situations as well.

We had hoped to determine the relationship between emotional perception and the ability to introspect about emotions. As our measure of emotional introspection, we chose the recently developed Toronto Alexithymia Scale (TAS; Taylor et al., 1985). Alexithymia is a diagnostic category thought to describe individuals who have poor access to emotion words. Results from this study and others, however, suggested that the Toronto scale may be a measure of general distress rather than lack of introspective ability. For example, many of the scale items asked about poor understanding of one's emotions, which was known to correlate with sadness and possibly depression (Mayer & Gaschke, 1988). Furthermore, the Toronto scale correlated with other distress measures such as the Eysenck Neuroticism Scale and Beck Depression Inventory (Mayer, Salovey, Gomberg-Kaufman, & Blainey, 1990). Thus, it is probably best to group the TAS and Neuroticism scales together as measures of distress. Distressed individuals experienced both more negative affect and more mood swings (Eysenck, 1973). Correspondingly, these individuals perceived a higher level of emotion (that was generally negative) and more emotional range among the stimuli. Thus, a person's negative internal experience corresponded to their external perceptions of it in ambiguous visual stimuli.

Another finding of importance was that emotional perception was not limited to emotional facial expressions, but extended to colors, and even novel graphics. The fact that people display a general ability to detect consensual emotional content across all three of these domains suggested that people were not simply responding to overlearned universals of the face, for example, but were able to predict accurately the emotional content in stimuli that were novel. Such individuals may have been able to do this because they understand others' thought processes, or there may have been universal rules for the extraction of emotion that were so general as to extend beyond the defining lines, curves, and shadows of the face, and into those of colors and designs. It may be that such processes underlie some responses to tests that combine colors and figures such as the Rorschach.

In conclusion, these results suggest that aspects of emotional intelligence appear to be abilities, in the traditional sense, that can be measured through the use of tasks, such as the one described here. The acknowledgment that qualities, such as empathy, involve well-defined skills rather than only attitudes and sentiments, suggests that individuals with interpersonal difficulties might suffer, not from attitude problems, but from skill deficits that can be assessed and ameliorated. Such work may enable the emotionally unintelligent person—for

example, the boor and the bore—to become more emotionally pleasing to those around them, with a resultant higher level of satisfaction with life for all those involved.

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