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Abstract

Nonverbal decoding refers to the act of recognizing and interpreting the meaning of other people's nonverbal cues. Decoding skills vary depending on many factors such as personality and environment (Knapp & Hall, 2009). The present study focused on six individual difference measures (the EPI, IOS, PSI, SCS-R, 20-item Shyness Scale, and TSIS) and an experimentally manipulated variable of self-consciousness, to determine their relationship with nonverbal decoding accuracy on two tasks: the METT and the VNDT. The results indicated that four individual difference measures—extraversion, sociability, shyness, and moving toward others—interacted at significant levels with the self-consciousness variable. These predictor variables were found to have a greater impact on performance on the METT than on the VNDT. It is suggested that future research utilizes real interactions as the basis of their decoding task.

The Effects of Individual Differences and Self-Consciousness on Nonverbal Decoding Accuracy

Nonverbal behavior is considered the "primary medium for the communication of affect" (Feldman, Philippot, & Custrini, 1991 p. 332; also see Argyle, 1969; Buck, 1984; Cacioppo, Martzbe, Petty, & Tassinary, 1988) and has been researched quite extensively and comprehensively. Successful nonverbal communication requires social skills, which include social competence (Feldman & Rimé, 1991). Highly socially skilled individuals can naturally express their emotion and state of mind through their body language and interpret others' nonverbal messages accurately. The act of sending out nonverbal messages is called encoding; the act of noticing and interpreting the nonverbal cues of others is called decoding. Examples of nonverbal cues include but are not limited to: facial expressions, posture, gestures, touch, personal space, and tone of voice (Knapp & Hall, 2009). Accurately decoding other people's nonverbal cues is crucial not only in social life and personal relationships but also in academic performance (Feeney, Noller, & Callan, 1994; Halberstadt & Hall, 1980; Izar et al., 2001; Nowicki & Duke, 1992, 1994). Often times, good encoders are also good decoders; however, the mechanism of encoding differs from the mechanism of decoding. The main concern of the present study is the structure of individuals' decoding skills.

The Effect of Personality on Decoding Accuracy

Decades of research have indicated that the ability to decode nonverbal cues significantly varies among individuals. Such variability is influenced by many personal factors such as gender, age, upbringing, cultural background, personality, cognitive ability, and knowledge of nonverbal cues (Knapp & Hall, 2009). In particular, personality has been closely studied as a major cause of such variability.

Introversion and extraversion. Introversion is as a good example of how personality affects decoding ability. Compared to extroverts, introverts receive lower scores on decoding tasks (Akert & Panter, 1988), identify fewer types of nonverbal cues (Knapp & Hall, 2009), and pay less attention to details in the social domain (Akert & Panter, 1988; Eysenck & Eysenck, 1968). Researchers reason that, similar to shy individuals, introverts tend to avoid face-to-face social interactions, which leads to fewer opportunities to improve their skill at nonverbal decoding (Akert & Panter, 1988). Extraversion is found to positively correlate with visual-based decoding ability (Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979), audio-based decoding ability (Mill, 1984), and the combination of both visual- and audio-based decoding ability (Akert & Panter, 1988).

However, the results of research in this area are often contradictory. For instance, while extroversion has been found to positively correlate with decoding skills due to extroverts' rich social experiences (Akert & Panter, 1988; Argyle & Lu, 1990a, 1990b), Cunningham (1977) suggests that extroversion is only related to encoding skills—and not to decoding skills. He reports that decoding skills are in fact positively correlated with neuroticism: Neurotic people are excessively anxious in social situations, which in turn motivates them to acquire a high level of nonverbal perceptivity (Cunningham, 1977). In addition, a number of studies have failed to find a significant correlation between extraversion and decoding ability (Ambady, Hallahan, & Rosenthal, 1995; Riggio & Friedman, 1982; Rosenthal et al., 1979).

Shyness. Contradictory results have also been found for the relationship between shyness and decoding accuracy. Some research has found that shy people perform worse than not-shy people on nonverbal decoding tasks. It has been suggested that shy individuals tend to avoid engaging in social interaction and thus get less practice in nonverbal communication, with the result that their abilities to encode and decode nonverbal cues are poorer than not-shy individuals (Schroeder, 1995; Schroeder & Ketrow, 1997). Moreover, shyness is also related to cognitive interference when processing social information (Cheek & Melchior, 1990; Schroeder, 1995). While many studies indicate that not-shy individuals outperform shy individuals on decoding tasks and other social information processing tasks (e.g., McClure & Nowicki, 2001), other studies have found no significant correlation between shyness and decoding accuracy (Akert, Cheek, Rutenberg, Ahern-Seronde, & Dautoff, 2010; Akert, Dautoff, Ahern-Seronde, & Cheek, 2009; Young & Brunet, 2011).

One possible reason for these mixed results may be a misunderstanding of shyness; not all shy individuals have the same social motivations. Caspi, Elder, and Bem (1988) examined shyness through the perspective of two interpersonal styles, which have distinctive affiliation needs, *moving toward others* and *moving away from others* (Horney, 1945). Moving toward others is an attachment style characterized by overly dependent behavior, motivated by a high need for understating, emotional support, and positive exchanges with others. Moving away from others is an attachment style characterized by excessive concerns over independence and self-sufficiency, which results in compulsive detachment from others. Caspi, Elder, and Bem (1988) suggest that these interpersonal styles affect one's personal relationships more strongly than does shyness.

Moreover, the distinction between shyness and sociability is key to understanding the relationship between shyness and decoding accuracy. Cheek and Buss (1981) found that shyness and sociability correlate at only -.30, which suggests that low sociability does not mean shyness: assuming shy individuals desire less affiliation is misleading. In addition, Young and Brunet (2011) found a significant relationship between sociability—not shyness— and decoding accuracy. The authors concluded that this discrepancy in performance between those of high and low sociability individuals was not caused by anxiety, as is the case with shyness; poorer decoding accuracy in low sociable individuals was linked to less experience in social interactions (Young & Brunet, 2011).

Private and public self-consciousness. Self-consciousness and social anxiety, which are positively and highly correlated with shyness, are also found to affect decoding accuracy (Schroeder, 1995). Socially anxious individuals tend to misjudge emotions conveyed in others' nonverbal behaviors (McClure & Nowicki, 2001), and a high level of self-consciousness is linked to inadequate and ineffective social skills (Christensen, 1982). Self-consciousness was well studied by Fenigstein (1975), who created the most widely used scale for self-consciousness, the Self-Consciousness Scale (SCS; Fenigstein, Scheier, & Buss, 1975). It consists of 23 items measuring three dimensions of self-consciousness: private self-consciousness, public self-consciousness, and social anxiety. *Private self-consciousness* refers to a propensity to pay attention to the details of one's feelings, internal processes, covert parts of the self, privately held beliefs and values, and knowledge of self-aspects (Franzoi, Davis, & Young, 1985; Harrington & Loffredo, 2007; Scheier & Carver, 1985). This subscale moderately correlates with the public self-consciousness ($r \geq .23$, $p < .01$) subscale but not with the social anxiety subscale (Fenigstein et al., 1975). *Public self-consciousness* refers to a tendency to worry about one's public image and to self-analyze it (Franzoi, Davis, & Young, 1985; Harrington & Loffredo, 2007; Scheier & Carver, 1985). This subscale moderately correlates with the social anxiety subscale ($r \geq .20$, $p < .01$; Fenigstein et al., 1975). *Social anxiety* is defined as the experience of discomfort when others are present (Fenigstein et al., 1975).

While the public self-consciousness subscale positively correlates with shyness, the private self-consciousness subscale does not (Tabata, 2009). Harrington and Loffredo (2007) found that private self-cosnciousness—and not public self-consciousness—is linked to *self-reflectiveness (SR)*, *internal self-awareness (ISR)*, and *psychological well-being (PWB)*. They found that increased self-consciousness is linked to an elevation of SR and ISA, but its link to PWB depends on the level of SR and ISA. When SR levels are high, PWB levels go down; however, SR levels alone does not predict PWB. The authors found a negative correlation between SR levels and PWB levels *only* when ISA levels are high. When looking at the subscales of PWB, this complex relationship becomes clear. *The positive relations with others (PRO)* subscale in PWB significantly intereacts with both SR and ISR: raised self-consciousness negatively correlates with PRO levels, which means highly self-conscious individuals would have difficulty relating to others effectively. Increased private self-consciousness causes people to be self-occupied, leading them to regard others less, which in turn causes problems in social settings.

Developing Measures for Nonverbal Decoding Accuracy

Hall, Andrzejewski, and Yopchick (2009) conducted a meta-analysis on the relationship between interpersonal sensitivity (IS) and decoding accuracy. Interpersonal sensitivity is: the act of accurately judging or recalling others' behaviors and engaging in interpersonally appropriate behaviors, and psychosocial characteristics of the perceiver, which include personality traits, social and emotional functioning, life experiences, values, attitudes, and self-concept (Hall et al., 2009). The authors found that individuals' self-assessed nonverbal decoding skills positively predicted their measured IS. They report that higher IS is correlated with favorable personality traits, such as extraversion and empathy, indicating that decoding skills are closely related to adaptive psychosocial functioning. With the Profile of Nonverbal Sensitivity (PONS; Rosenthal et al., 1979) as a decoding accuracy measure, Hall et al. (2009) found that IS correlates with negative personality traits such as neuroticism (mean $r = -.08$, $p < .01$), shyness (mean $r = -.18$, $p < .01$), and depression (mean $r = -.09$, $p < .10$). Although these correlations of personality traits and IS are statistically significant, the ranges of these correlations are rather large: extraversion ($r = -.29$ to .47), empathy ($r = -.24$ to .33), neuroticism ($r = -.48$ to .27), shyness ($r = -.28$ to .11), and depression ($r = -.44$ to .41; Hall et al., 2009). As these wide ranges signify, it is quite difficult to capture the complex relationship between personality traits and decoding accuracy.

Recent research suggests three possible variables that might increase the ability of personality variables to predict decoding accuracy. These are: the use of a more complex, ecologically valid decoding task; the presence of competing tasks, creating greater cognitive load; and the brief presentation of nonverbal cues. All three of these variables create a more complex, demanding task for the decoder. It may be that only under conditions of greater complexity will individual difference measures offset decoding performance.

Multi-channel nonverbal decoding task. How to measure one's decoding ability has been the center of discussion in the field of nonverbal communication research. Measures in the past were often single-channel tasks, in which participants looked at, for example, still pictures of facial expressions and judged which emotion was expressed (e.g., Ekman & Friesen, 1975). One of the major problems with single-channel tasks is that they lack external validity. In real life, we rarely see *only* the face of others with whom we interact. Many interpretive clues exist in the stream of nonverbal behaviors: the combination of tone of voice and facial expressions, as well as the combination of gestures and posture, and so on (Archer & Akert, 1980). In addition, multi-channeled presentations of nonverbal cues can be presented in real-time (e.g., through the use of videotape) including onset, off set, and duration information about the nonverbal cues. None of this information is available in still photograph presentations. Finally, multi-channeled presentations can include context or situational information. An example of a multi-channel decoding task is the Social Interpretations Tasks (SIT; Archer & Akert, 1980), which presents visual and auditory nonverbal information about social situations. The participants' task is to interpret the nature of the interaction. For example, the participant sees a videotaped scene of a woman talking on the phone and hears the woman's speech. The participants are then asked to judge whether the woman is talking to another woman or to a man. This measure is a multi-channel task, in which the participants observe a variety of naturally-occurring verbal and nonverbal cues at the same time. The multi-channel task has a higher external validity because the participants can connect one behavioral cue with another to construct the complete picture of the interaction, just as it occurs in everyday life.

Researchers have hypothesized that the greater complexity of a multi-channel nonverbal decoding task is needed to test adequately the personality-accuracy hypothesis. For example, Akert and Panter (2008) developed a new measure, the “Visual Nonverbal Decoding Task” (VNDT). In this task, participants watch a series of short videos of people interacting in dyads, without sound. They are asked to choose what the conversational topic is for each scene, from a list of four choices. When decoding, people simultaneously pay attention to many different behavioral factors, such as facial expression and posture, to examine what true emotion or state of mind the encoder is experiencing. For example, if someone was smiling but crossing his arms stiffly and speaking in a flat tone, his smile would be interpreted as fake. Combining several pieces of behavioral information together is the essential component to decoding nonverbal cues accurately. The ability to process a variety of information concurrently depends upon one's tolerance for sensory stimulation, which varies among individuals: Interpreting different channels—whether they are verbal or nonverbal—involves handling a great deal of sensory stimuli (Akert & Panter, 1988). Research has found that extroverts are able to handle higher levels of sensory stimulation in both auditory and visual modalities (Eysenck, 1971; Friedman & Meares, 1979), and enjoy higher levels of external stimulation than introverts (Ludvigh & Happ, 1974; Weisen, 1965).

Multi-tasking and decoding accuracy. Lieberman and Rosenthal (2001) shed new light on this issue and claim that personality interacts with decoding performance only when people are multi-tasking or under cognitive load; that is, when decoding nonverbal cues is the secondary task. They conducted a study to test the relationship between working memory and nonverbal decoding accuracy. Participants completed a measure of extraversion/introversion prior to their experimental sessions and were assigned to one of three conditions: PONS-focus, N-back-focus, and PONS-only. The participants in all conditions took the audio PONS test (Rosenthal et al., 1979) in which the participants were asked to choose an accurate description of a brief audio clip that they heard. Each of the 2-second filtered audio clips contained an adult female's speech. Then, the participants were asked to choose between two descriptions (e.g., "expressing jealousy" and "scolding a child"). For the PONS-focus and N-back focus conditions, the participants had to simultaneously engage in the N-back task (O'Reilly, Braver, & Cohen, 1999) while performing the audio PONS (Lieberman & Rosenthal, 2001). The N-back task (O'Reilly et al., 1999) is a target-detection task, which has four levels of difficulty. In each level, the participants make a target response, by indicating *yes* or *no*, to each of the successive letters presented on a computer monitor. In the 0-back level, the participants are told to respond *yes* only when the letter *B* appears on the computer screen. In the 1-back level, the participants respond *yes* only when a repetition of letters that appears on the screen are not intervened, that is, the repeated letter is *one back* in the sequence (e.g., *E*-*Q*-***L***-***L***). In the 2-back level, the participants respond *yes* only when a repetition of letters appear on the screen has a single intervening letter, that is, the repeated letter is *two back* in the sequence (e.g., *E*-***L***-*Q*-***L***). In the 3-back level, the participants respond *yes* only when the repeated letter is three back in the sequence (e.g., *E*-***L***-*A*-*Q*-***L***). The main portion of the N-back task contains 360 letters that are presented on the computer screen successively. Each letter is presented for 500 milliseconds with a 2-second interval for the participants to respond. The participants are expected to press either one key to respond YES or another key to respond NO. The speed and accuracy of each response was measured.

While completing two tasks simultaneously, the participants in the PONS-focus condition were told to focus more on the audio PONS test, and the participants in the N-back-focus condition were told to focus on the N-back task. In the PONS-only condition, the participants only performed the audio PONS test and had no secondary task. Lieberman and Rosenthal (2001) found that introverts and extroverts performed equally well on the PONS when no secondary task was involved. However, inroverts performed poorer than extroverts on the PONS when they had a secondary task in the 0-back level. In addition, the decoding accuracy of the introverts in the N-back-focus condition was the worst among all the other conditions. The authors conclude that introverts have less "grace period" in their multitasking ability before the cognitive intereference began; therefore, introverts' decoding accuracy decreases only if introverts engage in multitasking and also if the nonverbal decoding task is not the primary goal.

While Lieberman and Rosenthal's (2001) study brought a new perspective to the field of nonverbal communication research, their study's results contain some problems when applied to real world examples. First, their study's nonverbal task has weak external validity; the N-back task that the participants engaged in does not occur naturally. Second, their study only examined the decoding accuracy of auditory cues and not visual cues; decoding visual cues are more widely employed in everyday life. Finally, the N-back task was time-restricted; however, the author did not discuss how the brief presentation time of nonverbal cues might interact with personality traits, which might have caused the discrepancy in the decoding accuracy.

Limited exposure time to nonverbal cues. Young and Brunet's (2011) also took a new approach to measuring nonverbal decoding accuracy; they manipulated the exposure time of the presentation of facial expressions to examine how the length of presentation time influences shy/not-shy and high/low sociability individuals' performance on a decoding task. The authors randomly assigned participants to one of two conditions: brief presentation and unlimited presentation. The participants in the brief presentation condition viewed each of twelve facial expressions for only 250 milliseconds, and were asked to judge which emotion was conveyed in each facial expression. The participants viewed a set of twelve facial expressions portraying six emotions (sadness, anger, happiness, surprise, disgust, and fear), displayed by six faces of male and six faces of female encoders; they were allowed to view each stimulus twice (Young & Brunet, 2011). The authors found that low sociability participants performed poorly on the nonverbal decoding tasks *only if* the exposure time of the facial expressions was brief; under the unlimited presentation condition, participants low in sociability decoded facial expressions as accurately as participants high in sociability (Young & Brunet, 2011). Given this prior research, the present investigation employs two nonverbal decoding tasks: one that presents facial expressions for only 40 milliseconds, and another that presents short video scenes of multi-channeled nonverbal communication, in which people interact naturally in real-life conversations.

Self-Consciousness Manipulation

Davies (2005) found that the use of a video camera interacts with some personality traits, leading to a decrease in attention when performing simple tasks. He reported that the presence of a video camera, though not a mirror, negatively affected individuals high in public self-consciousness when they performed a simple task. Davies (2005) also found that the presence of a mirror, but not a video camera, greatly affected individuals who were high in private self-consciousness. These findings suggest that private self-consciousness intensifies self-awareness inwardly while public self-consciousness intensifies it outwardly. In order to affect participants who may have private or public self-consciousness, participants are filmed through a web camera while their face appears on the computer screen. A web camera combines the functioning of a mirror and a video camera, thus it is an effective device for inducing a high level of self-consciousness in participants.

The present study experimentally manipulates participants' self-consciousness while they respond to two nonverbal decoding tasks, the VNDT (Akert & Panter, 2008) and the METT (Ekman, 2002). Participants are randomly assigned to one of three conditions: the low self-consciousness condition, in which they are told that their facial expressions would be video-recorded through a web camera for later analysis; the high self-consciousness condition, in which they are told the above, but they see the video-recording of their faces on the computer screen; and the control group, who are not filmed and do not see their faces on the computer screen. Participants also completed six individual differences measures through an online survey site, *Survey Monkey*: extraversion, sociability, moving towards others/moving away from others, private/public self-consciousness, shyness, and social intelligence. The dependent variables are the accuracy scores on the two nonverbal tasks.

Hypotheses

In the present study, it is hypothesized that participants who rate themselves high on three individual difference variables—moving away from others, shyness, and private and public self-consciousness—will score significantly lower on each of the two nonverbal decoding tasks than participants who rate themselves low on these variables. Furthermore, it is hypothesized that the experimental manipulation of self-consciousness will have a significantly greater effect on decoding accuracy for people who rate themselves high on these variables than people who rate themselves low. Specifically, participants who rate themselves high on these variables are expected to demonstrate significantly lower nonverbal decoding accuracy in the high self-consciousness condition than in other two conditions, and moderately lower nonverbal decoding accuracy in the low self-consciousness condition than in the control condition. For participants who rate themselves lower on these variables, it is hypothesized that the self-consciousness manipulation will have little effect on their decoding performance. The decoding scores of people in the low self-consciousness conditions and the control condition are hypothesized to be similar; decoding accuracy could be somewhat lower in the high self-consciousness condition due to the possible distractibility of the manipulation.

Finally, for the other three personality variables—extraversion, sociability, and social intelligence—the same pattern of results is hypothesized, except in the opposite direction. That is, participants who rate themselves low on these variables are hypothesized to react the most strongly to the self-consciousness manipulation, leading to decreased nonverbal decoding accuracy. The decoding scores of participants who rate themselves high on these variables are expected to show little effect of self-consciousness manipulation. Participants who rate themselves high on these variables would be more accurate decoders than those who rate themselves low, across all three experimental conditions.

Method

Participants

One hundred and twenty female undergraduates at Wellesley College volunteered to participate in the one-hour study in exchange for ten dollars (M_{age} = 20 years, *SD* = 3.27, age range: 17-54 years). The study took place in a computer lab in the Wellesley College Psychology Department.

Procedure

The research participants were randomly assigned to one of three experimental conditions: the high self-consciousness condition, the low self-consciousness condition, or the control group (no manipulation of self-consciousness). Each experimental session had three to five participants. The participants in a given session were randomly assigned to the same condition so that they would not detect the manipulation. Participants were told that the study focused on how people make judgments about others, particularly by using nonverbal cues, and also how they perceived their own personalities.

First, the participants in the high or low self-consciousness conditions were shown their faces on their computer screen via a web camera, and told this video would be recorded for a later analysis. The control group was not shown their faces nor were they told that their expressions would be analyzed later. Next, all participants responded to two nonverbal decoding tasks, presented individually on their own computers. After they completed their nonverbal decoding tasks, they responded to a packet of self-report individual difference measures. These were presented in an online questionnaire format, with accompanying five- or seven-point Likert scales. After the participants completed the questionnaires, they were thanked and debriefed. The participants' answers to the questionnaires and the decoding tasks were kept anonymous and confidential; their recorded videos were deleted immediately after the participants were debriefed.

Self-Consciousness Manipulation

In the high self-consciousness condition, the participants saw two windows on their individual computer monitors: one that showed the nonverbal task and another that showed their faces as filmed through the attached web camera. Although the size of the window for showing the face was smaller (approximately 6 in. by 5 in.) than the window for the nonverbal task (approximately 12 in. by 8 in.), the participants responded to the nonverbal tasks while their faces appeared on the screen. The participants were told that the camera was recording their facial expressions as they completed the nonverbal tasks, and that the experimenter would be coding their facial expressions later. The purpose of this manipulation was to induce a high level of self-consciousness.

The participants in the low self-consciousness condition did not see their faces on the computer monitor when they completed the two nonverbal tasks. However, they were told that their faces were being filmed through the web camera as they did the nonverbal tasks. To ensure the manipulation is effective in the low self-consciousness condition, the experimenter showed these participants the window in which their faces appeared, and informed them that their faces were being filmed and recorded through the web camera. They were told that the experimenter would code their facial nonverbal expressions later. Then, the experimenter minimized the window (approximately 1 cm by 1 cm) so that the participants could not see their faces while completing the nonverbal tasks. Finally, participants in the control group completed the nonverbal tasks without being filmed or seeing their faces on the computer screen.

Prior studies have shown that use of a camera affects self-consciousness and changes people's behavior. For example, camera-induced self-attention is found to change people's attitudes following counter-attitudinal behavior (Insko, Worchel, Songer, & Arnold, 1973; Wicklund & Duval, 1971). The use of a camera is also found to decrease task-focused attention, which lowers performance on concept formation tasks for highly self-conscious individuals (Brockner, 1979). Although a mirror has been widely employed to induce self-consciousness, use of a mirror in a computer lab would evoke a sense of strangeness in participants' minds. The benefit of using a web camera was that it combined the effect of mirror and camera: by using a web camera, the participants knew that they were being filmed and they also saw their faces on the computer monitor like in a mirror. This combination effect bolstered the induction of self-consciousness in participants.

Measures

Nonverbal Decoding Tasks. *Visual Nonverbal Decoding Task* (*VNDT*; Akert & Panter, 2008; Akert et al., 2010). The VNDT consists of 24 brief scenes taken from the 1980's PBS and ABC talk shows hosted by Dick Cavett. The scenes are shown without sound. In the scenes, the host, Dick Cavett, interviews a number of guests; the conversation topics vary from the guests' childhood memories to their recent work. The participants' task was to determine what the conversational topic was in each scene by observing the host's and the guest's nonverbal behavior. Before watching each scene, the participants read four possible answer choices for the conversational topic in their questionnaire booklet. The answer choices included only one right answer and three other choices; these three other choices were the conversational topics covered by the host and the guest at other times during the interview. After watching each scene, participants circled their answer choice in the questionnaire booklet.

For example, in Scene 4, the world-renowned musician, YoYo Ma, spoke about meeting a master cellist whom he had always respected. In the video, Ma displayed facial expressions and gestures to describe how happy he was to meet the cellist. The answer choices for this scene were: "YoYo remembers meeting a master cellist two times," "YoYo recalls an unpleasant experience," "YoYo describes his college years at Harvard," and "YoYo is talking about his second cousin in China." Each scene lasted about two minutes, and there were eight-second intervals between scenes to allow participants to choose their answer and read the next scene's choices. Because of time limitations, only the last twelve scenes of the VNDT were used in the present study. The accuracy percentage for the twelve scenes ranged from 20.8% to 79.2%.

Micro Expression Training Tool (*METT*; Ekman, 2002). METT was created to train people to improve their accuracy in recognizing micro-momentary nonverbal expressions. A micro-momentary expression is defined as a very sudden onset and offset of a facial expression (e.g., anger); it appears as a brief flash on a person's face (Ekman, 2002). The first two parts of the METT involve training viewers how to read emotions on the face. It mainly emphasizes quick changes in parts of a face. Examples of changes include: wrinkles in the nose area (for detecting disgust), a flash of widely opened eyes (for detecting surprise), and tightened lips (for recognizing anger). The third part of the METT provides a self-test of decoding micro-momentary expressions. In each test item, a different person appears. He or she first shows no expression. Then, suddenly, a facial expression of one of seven emotions appears very briefly, for only 40 milliseconds, immediately returning back to the expressionless face. This quick presentation is accomplished by presenting three still photographs briefly on the computer screen (i.e., neutral, emotional expression, and then neutral). After each quickly flashed expression, the participants must choose which of the seven emotions was displayed: anger, fear, disgust, contempt, sadness, surprise or happiness.

The present study used only the testing section of the METT, which consists of 14 still photographs (i.e., 14 items). The METT was included in the present study as a comparison to the VNDT. For example, the METT and VNDT differ in presented channels (single channel facial expression versus multi-channel, respectively) and in exposure time (extremely brief exposure versus real-time exposure, respectively). Thus, the METT and VNDT tap into different types of nonverbal decoding ability, and together offer an expanded test of the hypothesis. A few prior studies have used the METT as a decoding task instead of as a training tool (Marsh et al., 2010; Matsumoto et al., 2000; Warren, Schertler, & Bull, 2009).

The METT comes with an automatic scoring function that presents the accuracy percentage on the screen when the test is completed. Thus, participants knew how well they did on the METT as they finished it. In order to control for this confound, the METT was the second and final nonverbal task. The accuracy percentage for the present study's sample ranged from 10% to 90%.

Individual Difference Measures. *Eysenck Personality Inventory* (*EPI*; Eysenck & Eysenck, 1968). The EPI consists of 57 items with three subscales: extraversion (24 items), neuroticism (24 items), and faking (lie scale: 9 items). The present study only used the extraversion subscale. The extraversion subscale measures the degree to which one is out-going and interacts with others. Examples of items in the extraversion subscale are, "Are you a talkative person?" and "Do you like mixing with people?" Each item is answered with "yes" or "no" (Eysenck & Eysenck, 1968). Lieberman and Rosenthal (2001) conceptualized introversion as individuals who score low on the extraversion subscale of the EPI. The extraversion subscale's coefficient of inter-item correlation for the present study was .78. Eysneck and Eysenck's manual (1968) reported evidence for factorial validity, construct validity, and concurrent validity of the EPI.

Interpersonal Orientation Scale (*IOS;* Hill 1987). The IOS consists of 26 items, rated on the Likert scale from 1 (*not al all true*) to 5 (*completely true*), measuring individuals' trait-like preference for social interaction. The items are categorized into four subscales: emotional support (6 items), attention (6 items), positive stimulation (9 items), and social comparison (5 items). The present study only used the positive stimulation subscale as a measure for sociability. The positive stimulation subscale assesses levels of affiliation and the need to belong. An example of an item on this scale is, "I would find it very satisfying to be able to form new friendships with whomever I liked." The positive stimulation subscale's coefficient of inter-item correlation for the present study was .71.

Personal Style Inventory (*PSI;* Robins et al., 1994). The PSI consists of 48 items assessing individuals' interpersonal and achievement vulnerability (sociotropy and autonomy, respectively). Half of the items measure three subtypes of sociotropy—excessive concerns of what others think (Approval: 7 items), interpersonal dependency (Dependency: 7 items), and need to please others (Pleasing Others: 10 items). The other half of the items evaluates three subtypes of autonomy—self-critical perfectionism (Self Criticism: 4 items), need for control (Control: 8 items), and defensive separation (Defensive Separation: 12 items). For the present study, only two sociotropy subscales and one autonomy subscale were used: Dependency (e.g., "I find it difficult if I have to be alone all day"), Pleasing Others (e.g., "I often put other people's needs before my own"), and Defensive Separation (e.g., "I tend to keep other people at a distance"), respectively. All 29 items were rated on the Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*). These three subscales were selected to assess what Honey (1945) called the "moving towards others" and the "moving away from others" interpersonal styles. Cheek and Krasnoperova (1999) used Dependency and Pleasing Others subscales to measure moving toward others and used Defensive Separation subscale for measuring moving away from others. The alpha coefficient of internal consistency reliability for the PSI was .70: for moving toward others, $\alpha = .78$, and for moving away from others, $\alpha = .78$.

Self-Consciousness Scale Revised (*SCS-R*; Scheier & Carver, 1985). The SCS-R was developed because of the unclear wording used in the original *Self-Consciousness Scale* (Fenigstein et al., 1975). The SCS-R changed the wording of the items in the original scale such as "I never scrutinize myself" to "I never take a hard look at myself," and "Generally I am not very aware of myself" to "I know the way my mind works when I work through a problem." Scheier and Carver (1985) report that participants would ignore the items when wording confused them; thus the revised version was used in the present study to eliminate potential confusion. The SCS-R consists of 22 items rated on the Likert scale from 0 (*not at all like me*) to 3 (*a lot like me*), with the same three subscales as the original SCS. The subscale intercorrelations with the original SCS were very high (in the low to the mid .80s), suggesting that the revised scale is highly similar to the original scale. The present study employed only the private self-consciousness subscale (9 items) and the public self-consciousness subscale (7 items). The alpha coefficient of internal consistency reliability for the total scale was .81: for the private self-consciousness subscale was .74, for the public self-consciousness subscale was .76.

The 20-item Shyness Scale (Melchior & Cheek, 1985). The 20-item shyness scale is a revised version of the original 9-item Shyness Scale (Cheek & Buss, 1981). It is a self-report measure of the degree of shyness, rated on the Likert scale from 1 (*very uncharacteristic*) to 5 (*very characteristic).* This new version of the shyness scale assesses three dimensions of shyness: somatic (e.g., "I feel tense when I'm with people I don't know well), behavioral (e.g., "I am somewhat socially awkward."), and cognitive (e.g., "I feel painfully self-conscious when I am around strangers"). The alpha coefficient of internal consistency reliability for the 20-item Shyness Scale was .93.

Tromso Social Intelligence Scale (TSIS; Silvera, Martinussen, & Dahl, 2001). The TSIS consists of 21 items rated on the Likert scale from 1 (*describes me poorly*) to 7 (*describes me extremely well*). It is a self-report measure of *social intelligence*, which is people's ability to understand social context and successfully interact with others. The measurement has three sub factors: social skills (e.g., "I fit in easily in social situations"), social awareness (e.g., "People often surprise me with things they do"), and social information processing (e.g., "I can predict other peoples' behavior"). The alpha coefficient of internal consistency reliability for the total scale was .87. These three sub factors also showed acceptable rates: social skills ($\alpha = .87$), social awareness ($\alpha = .73$), and social information processing ($\alpha = .82$). Past research indicated a significant correlation ($r = .19$, $p < .05$) between the TSIS and nonverbal decoding accuracy (Akert et al., 2010).

Results

Preliminary Analyses

One-way analyses of variance (ANOVA) were conducted on the independent variable of self-consciousness conditions (high self-consciousness, low self-consciousness, and control) for each of the six personality measures: the Eysenck Personality Inventory (EPI), the Interpersonal Orientation Scale (IOS), the Personal Style Inventory (PSI), the Self-Consciousness Scale

Revised (SCS-R), the 20-item Shyness Scale (Shyness), and the Tromso Social Intelligence Scale (TSIS). These were conducted to determine if random assignment had in fact created groups that were equivalent. Each of these six one-way ANOVAs indicated no significant differences in mean scores across the three conditions: EPI, F (2, 117) = 2.25, p = .11; IOS, F (2, 117) = .25, p = .78; PSI, F (2, 117) = .37, p = .70; Shyness, F (2, 117) = .91, p = .41; SCS-R, F (2, 117) = .67 p = .51; TSIS, F (2, 117) = .74, p = .48. These results indicated that the three experimental conditions were equivalent in terms of personality scores. Table 1 shows the means and standard deviations for the six personality variables used in the study.

Table 1
Mean Scores of the Personality Scales Across the Three Self-Consciousness Conditions

Personality Scales	High		Low		Control	
	M	*SD*	*M*	*SD*	*M*	*SD*
EPI	9.30	(2.60)	10.38	(2.81)	9.18	(2.93)
IOS	3.11	(.71)	3.17	(.59)	3.22	(.73)
PSI	3.71	(.48)	3.79	(.41)	3.74	(.44)
Shyness	2.72	(.76)	2.79	(.86)	2.96	(.86)
SCS-R	3.02	(.54)	3.14	(.38)	3.11	(.47)
TSIS	4.83	(.70)	4.96	(.93)	4.74	(.81)
n	40		40		40	

To check whether the levels of self-consciousness had an effect on individuals' nonverbal decoding accuracy, two one-way ANOVAs were conducted to examine whether scores on the two nonverbal communication tasks, the Visual Nonverbal Decoding Tasks (VNDT) and the Micro Expression Training Tool (METT), differed across the three experimental conditions (high or low self-consciousness and control). These results (N = 120) revealed no significant differences among the mean scores for two nonverbal decoding tasks, the VNDT, F (2, 117) =

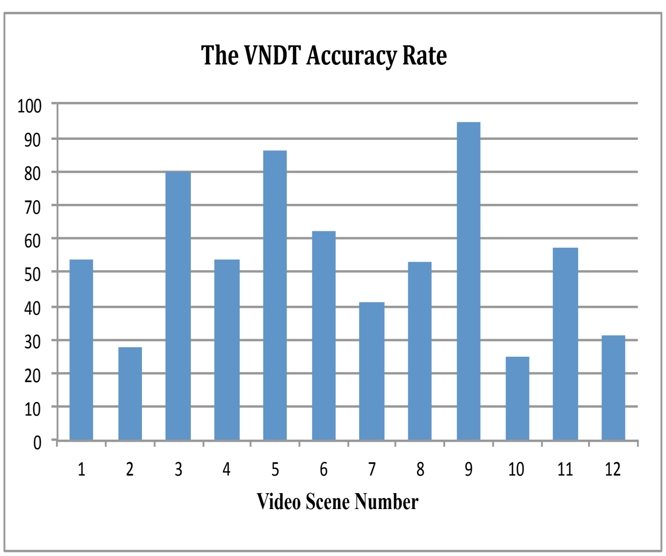
.88, p = .42, and the METT, F (2, 117) = 1.10, p = .34 across all conditions. These results indicated that the self-consciousness manipulation did not influence the participants' accuracy on the two nonverbal decoding tasks. Table 2 shows the mean scores and standard deviations for the VNDT and the METT across all three conditions.

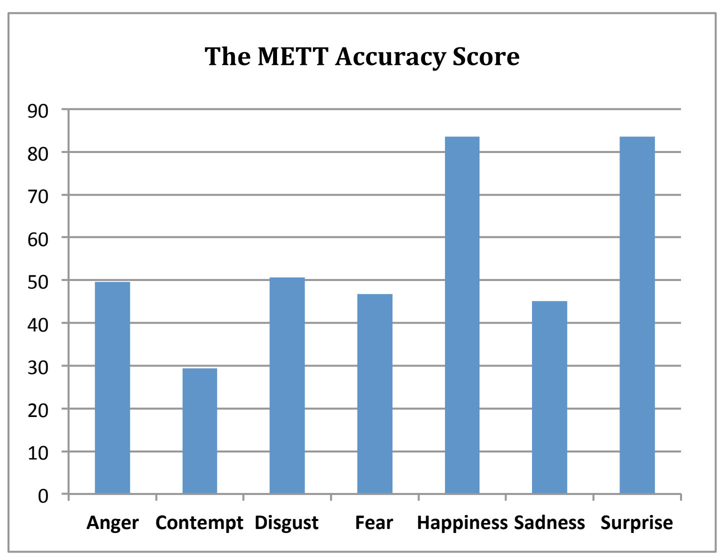
Table 2
Mean Scores of Nonverbal Decoding Tasks Across the Three Experimental Conditions

Nonverbal Decoding Tasks	High		Low		Control		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
VNDT	5.55	(1.91)	5.30	(1.36)	5.80	(1.74)	5.55	(1.74)
METT	57.13	(14.18)	61.38	(12.61)	57.13	(17.24)	58.54	(17.24)
n	40		40		40		120	

The range of the accuracy scores for the VNDT (*Min* = 2, *Max* = 10, out of 12) and the METT (*Min* =10%, *Max* = 90%, out of 100%) were reasonable and indicate that scores in the sample varied. See Figure 1 for the accuracy rates for each of the scenes of the VNDT and the METT, collapsed across the three conditions. Some items on the VNDT and the METT were more difficult to decode than others; note that the VNDT has four answer choices for each scene,

Figure 1. The accuracy rates of items in the VNDT and the METT across all experimental conditions.





producing a hypothetical chance accuracy rate of 25% for each scene. The majority of the VNDT scenes were decoded accurately at above chance levels (see Figure 1). Given that for each METT scene, the participants must choose one emotion from a list of seven, the hypothetical chance accuracy rate is 14%. All of the METT emotions were decoded accurately at above chance levels (see Figure 1).

Next, a Pearson correlation was conducted on the total scores of the VNDT and the METT, indicating that they were moderately correlated ($r = .28$, $p < .01$). While these two nonverbal decoding tasks were significantly correlated, they assessed different kinds of nonverbal decoding skills: the VNDT measured how well individuals could interpret several nonverbal channels presented simultaneously in real conversations, while the METT measured how well individuals could recognize subtle differences in facial expressions presented very quickly. Therefore, these two measurements examined a broad range of individuals' nonverbal decoding skills.

Overview: Analysis of the VNDT and the METT Accuracy Scores

Accuracy scores of the VNDT and the METT were analyzed using a stepwise method of multiple regression on each individual difference measure: the EPI (extraversion), the PSI (moving toward or away from others), the IOS (sociability), the SCS-R (public or private self-consciousness), the 20-item Shyness Scale (shyness), and the TSIS (social intelligence). Two dummy-coded variables for the self-consciousness experimental condition (high and low) were created, and they were entered along with each personality variable as predictors in Step 1. The two-way interaction between self-consciousness and each personality variable was entered in Step 2. Because all the personality variables were continuous, each variable was mean centered before calculating the interaction terms (Aiken & West, 1991).

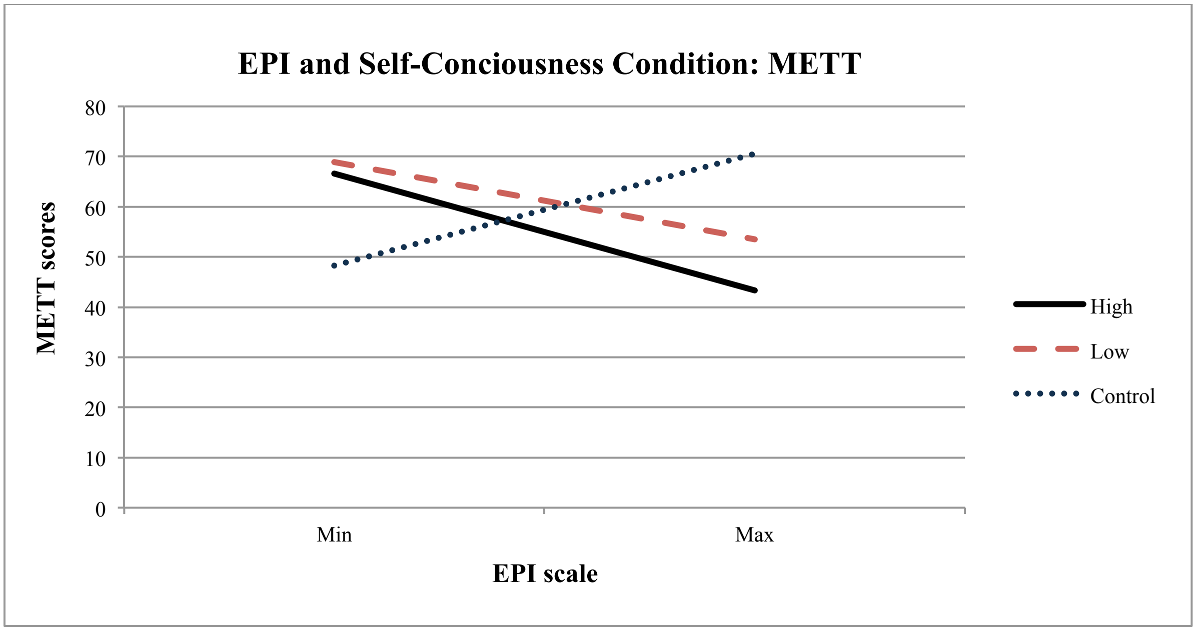
The Eysenck Personality Inventory (EPI): Extraversion. See Table 3 for a summary of the regression analysis with the EPI. Step 1 accounted for 2.1% of the variance in the METT scores, F (3, 116) = .842, p = .47. The addition of the two-way interaction terms (High*EPI and Low*EPI) in Step 2 accounted for an additional 8.4% of the variance in the METT scores, F (5, 114) = 2.68, p = .03. Analysis of the predictors in Step 2 indicated that there were significant main effects of the EPI and self-consciousness conditions on the METT. Across all experimental conditions, participants high in extraversion performed significantly better on the METT than participants low in extraversion. In addition, participants who were in the high and low self-consciousness conditions scored significantly better than the control condition. There was also a significant interaction of experimental condition and the EPI (see Figure 2). Tests of the simple slopes showed that for the high and low self-consciousness conditions, participants who rated themselves high on the EPI performed significantly worse on the METT than participants who rated themselves low on the EPI: t (114) = -2.97, p < .01, and t (114) = -2.57, p = .01, respectively. The multiple regression conducted on the VNDT scores with the predictor variable of extraversion indicated no significant effects.

Table 3
Stepwise Multiple Regression on the METT Decoding Performance

Step	Predictors	Coefficients (b)	t	R^2	R^2 Change
1	Intercept	41.41	5.51	.02	
	High	32.39	2.85**		
	Low	32.31	2.80**		
	EPI	1.71	2.20*		
2	EPI*High	-3.51	-2.97**	.11*	.08**
	EPI*Low	-2.90	-2.57*		

Note. *$p \leq .03$, **$p < .01$. High and Low are dummy-coded variables for experimental conditions with reference to the Control condition. Coefficients are shown for predictors in Step 2.

Figure 2. The regression analysis of the EPI and self-consciousness condition on the METT scores



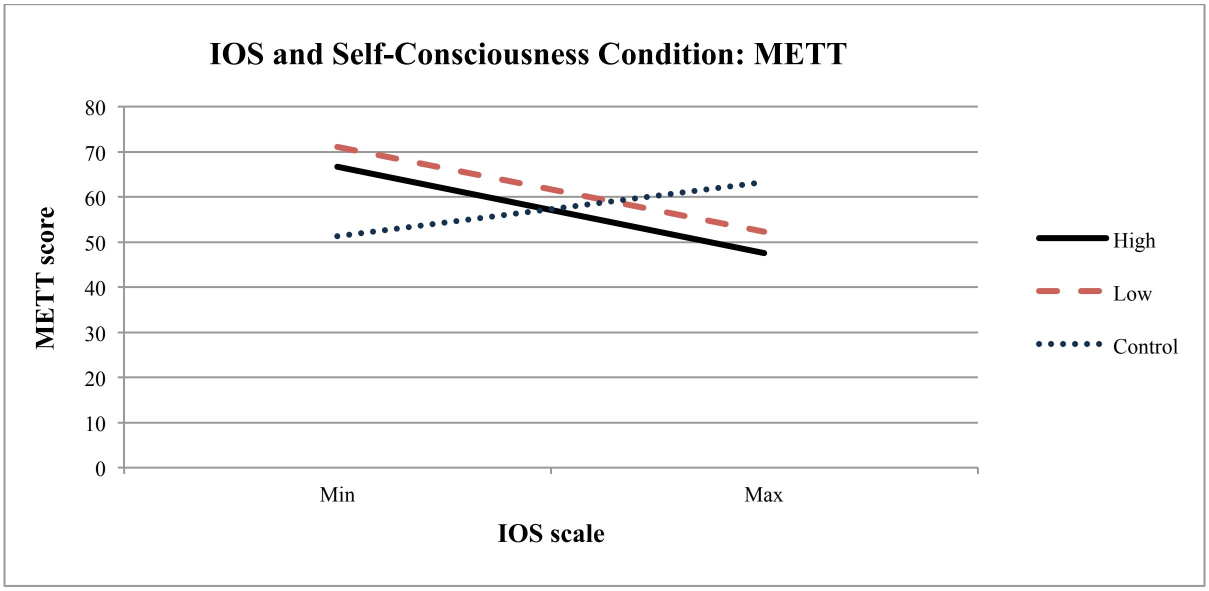
The Interpersonal Orientation Scale (IOS): Sociability. See Table 4 for a summary of the regression analysis with the IOS. Step 1 accounted for 2.9% of the variance in the METT scores, F (3, 116) = 1.14, p = .34. The addition of the two-way interaction terms (High*IOS and Low*IOS) in Step 2 accounted for an additional 4.6% of the variance in the METT scores, F (5, 114) = 1.83, p = .11. An analysis of the predictors in Step 2 indicated that there was no

Table 4
Stepwise Multiple Regression on the METT Decoding Performance

Step 1	Predictors	Coefficients (*b*)	*t*	R^2	R^2 *Change*
1	Intercept	56.93	24.66	.03	
	High	-.13	-.04		
	Low	4.46	1.37		
	IOS	3.70	1.17		
2	IOS*High	-9.65	-2.11**	.07	.05*
	IOS*Low	-9.56	-1.89*		

Note. *p < .07, **$p \leq$ .04. High and Low are dummy-coded variables for experimental conditions with reference to the Control condition. Coefficients are shown for predictors in Step 2.

Figure 3. The regression analysis of the IOS and self-consciousness condition on the METT scores



significant main effect for the IOS (*b* = 3.70, *p* = .25); there was no significant main effect for the self-consciousness conditions either (high *b* = -.13, *p* = .97, and low *b* = 4.46, *p* = .17, respectively). However, there was a significant interaction of experimental conditions and the IOS (see Figure 3). Tests of the simple slopes showed that for the high and low self-consciousness conditions, participants who rated themselves high on sociability performed significantly worse on the METT than participants who rated themselves low on sociability: *t* (114) = -2.11, *p* = .04, and *t* (114) = -1.89, *p* = .06, respectively.

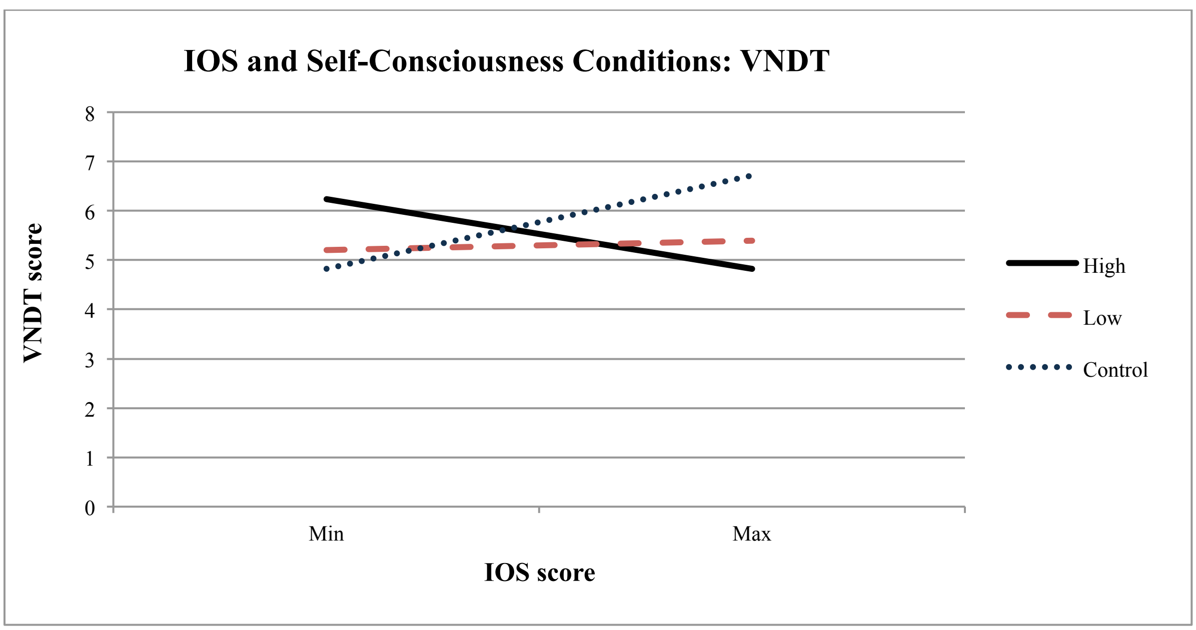
The analysis of the VNDT scores indicated no significant main effect for the IOS (*b* = .59, *p* = .11); there was no significant main effect for the self-consciousness conditions either (high *b* = -.24, *p* = .52, and low *b* = -.47, *p* = .22, respectively). However, a marginally significant interaction effect between the high self-consciousness condition and the IOS was found, *t* (114) = -1.95, *p* = .06 (see figure 4). Tests of the simple slopes showed that for the high self-consciousness condition, participants who rated themselves high on the IOS performed significantly worse on the VNDT than participants who rated themselves low. However, the interaction effect was not found in the low self-consciousness condition.

Table 5
Stepwise Multiple Regression on the VNDT Decoding Performance

Step 1	Predictors	Coefficients (*b*)	*t*	R^2	R^2 *Change*
1	Intercept	5.77	21.67	.02	
	High	-.24	-.65		
	Low	-.47	-1.25		
	IOS	.59	1.60		
2	IOS*High	-1.03	-1.95*	.05	.03
	IOS*Low	-.53	-.91		

Note. *$p < .04$. High and Low are dummy-coded variables for experimental conditions with reference to the Control condition. Coefficients are shown for predictors in Step 2.

Figure 4. The regression analysis of the IOS and self-consciousness condition on the VNDT scores



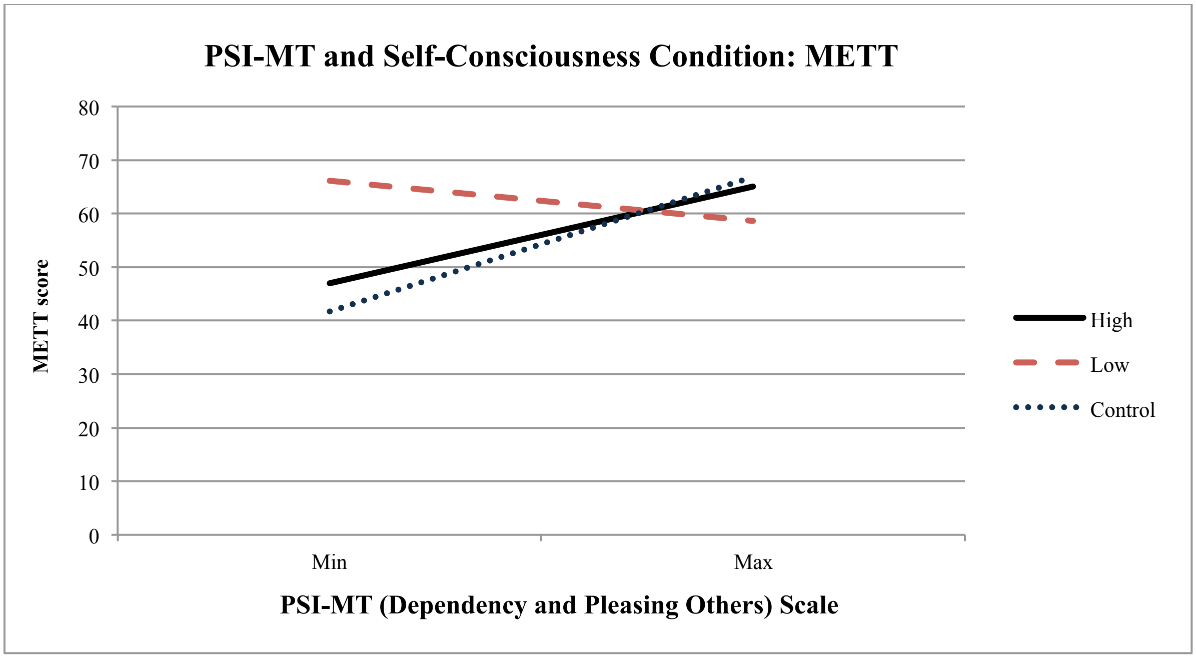
The Personal Style Inventory (PSI): Moving toward others. Moving toward others is measured by the combination of two sociotropy subscales of the PSI, Dependency and Pleasing Others (referred as the "PSI-MT" here). See Table 6 for a summary of the regression analysis with the PSI-MT. Step 1 accounted for 4.1% of the variance in the METT scores, *F* (3, 116) = 1.65, *p* = .18. The addition of the two-way interaction terms (High*PSI-MT and Low*PSI-MT) in Step 2 accounted for an additional 3.3% of the variance in the VNDT scores *F* (5, 114) = 1.82, *p* = .11. An analysis of the predictors in Step 2 indicated that there was a significant main effect for the PSI-MT; however, there was no significant main effect for the self-consciousness conditions (high *b* = .98, *p* = .77, and low *b* = 4.74, *p* = .15, respectively). Across all experimental conditions, people high in the PSI-MT performed better on the METT than people low in the PSI-MT. There was also a significant interaction of experimental condition and the PSI-MT (see Figure 5). Tests of the simple slopes showed that for the low self-consciousness condition, participants who rated themselves low on the PSI-MT performed significantly better on the METT than participants who rated themselves high: *t* (114) = -.24, *p* = .05. No significant interaction was found in the high self-consciousness condition.

Table 6
Stepwise Multiple Regression on the METT Decoding Performance

Step	Predictors	Coefficients (*b*)	*t*	R^2	R^2 Change
1	Intercept	56.84	24.64	.04	
	High	.98	.30		
	Low	4.74	1.45		
	PSI_MT	7.49	2.20**		
2	PSI_MT*High	-2.10	-.05	.07	.03
	PSI_MT*Low	-9.71	-.24*		

Note. **p* = .05, ***p* = .03. High and Low are dummy-coded variables for experimental conditions with reference to the Control condition. Coefficients are shown for predictors in Step 2.

Figure 5. The regression analysis of the PSI-MT and self-consciousness condition on the METT scores



For the regression analysis of the PSI-MT on the VNDT, please see Table 7. Step 1 accounted for 11.9% of the variance in the VNDT scores, F (3, 116) = 5.22, $p < .01$. The addition of the two-way interaction terms (High*PSI-MT and Low*PSI-MT) in Step 2 accounted for only an additional 1% of the variance in the VNDT scores ($\Delta r^2 = .01$, $p = .51$). An analysis of the predictors in Step 1 indicated that there was a significant main effect for the PSI-MT, but not for the self-consciousness conditions (high $b = -.10$, $p = .77$, low $b = -.55$, $p = .13$, respectively). Across all experimental conditions, people high in the PSI-MT performed better on the VNDT

Table 7
Stepwise Multiple Regression on the VNDT Decoding Performance

Step	Predictors	Coefficients (b)	t	R^2
1	Intercept	5.77	22.76	.12*
	High	-.10	-.29	
	Low	-.55	-1.53	
	PSI_MT	.87	3.70*	

Note. *$p < .01$. High and Low are dummy-coded variables for experimental conditions with reference to the Control condition.

than people low in the PSI-MT: *t* (116) = 3.70, $p < .01$. No significant interaction was found in the high or low self-consciousness condition.

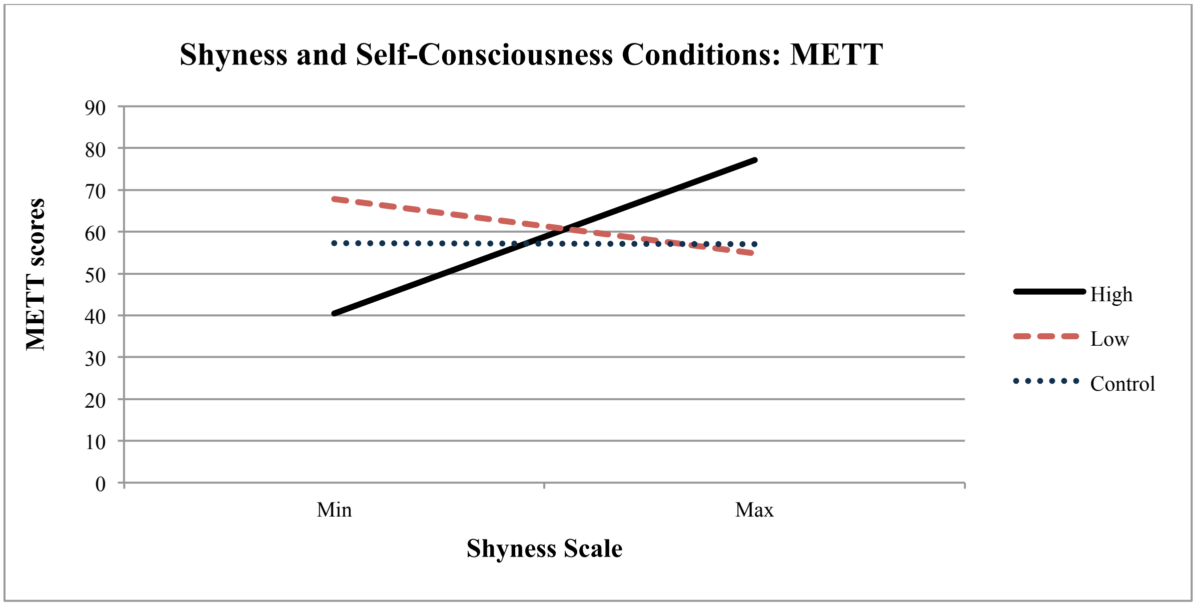
The 20-item Shyness Scale: Shyness. See Table 8 for a summary of the regression analysis with the 20-item Shyness Scale. Step 1 accounted for 7.2% of the variance in the METT scores, *F* (3, 116) = 3.0, $p = .03$. The addition of the two-way interaction terms (High*Shy and Low*Shy) in Step 2 accounted for an additional 5.2% of the variance in the METT scores, *F* (5, 114) = 3.24, $p < .01$. An analysis of the predictors in Step 2 indicated that there was no significant main effect for shyness ($b = -.05$, $p = .98$); there was no significant main effect for the self-consciousness conditions (high $b = 1.08$, $p = .74$, and low $b = 4.36$, $p = .18$, respectively). However, there was a significant interaction of experimental condition and shyness (see Figure 6). Tests of the simple slopes showed that for the high self-consciousness condition, participants who rated themselves high on shyness performed significantly better on the METT than participants who rated themselves low on shyness: *t* (114) = 2.60, $p = .01$. No interaction effect of shyness in the low self-consciousness condition was found. The multiple regression conducted on the VNDT scores with the predictor variable of shyness indicated no significant effects.

Table 8
Stepwise Multiple Regression on the METT Decoding Performance

Step	Predictors	Coefficients (*b*)	*t*	R^2	R^2 Change
1	Intercept	57.13	25.18	.07*	
	High	1.08	.34		
	Low	4.36	1.37		
	Shy	-.05	-.02		
2	Shy*High	10.38	2.60**	.12**	.05*
	Shy*Low	3.62	.97		

Note. *$p < .04$, **$p \leq .01$. High and Low are dummy-coded variables for experimental conditions with reference to the Control condition. Coefficients are shown for predictors in Step 2.

Figure 6. The regression analysis of the 20-item Shyness Scale on the METT scores



Finally, multiple-regression analyses involving the Self-Consciousness Scale Revised (SCS-R) and the Tromso Social Intelligence Scale (TSIS) indicated no significant main effects or interaction effects on the METT scores or the VNDT scores.

Discussion

To summarize, the results of the present study offer evidence that personality characteristics influence nonverbal decoding accuracy quite differently when the levels of self-consciousness are manipulated. The pattern of results for the predictor variables of extraversion and sociability indicated similar effects on decoding accuracy. Under the no manipulation or control condition, individuals high in extraversion and sociability decoded significantly more accurately than did individuals low in these personality traits. However, under the high and low self-consciousness conditions, individuals high in extraversion and sociability decoded significantly worse than individuals low in these personality traits. Interestingly, the effect of shyness and self-consciousness on decoding accuracy indicated a pattern somewhat the opposite of the above. Under the high self-consciousness condition, participants high in shyness decoded significantly more accurately than those low in shyness. The pattern for those in the low and control conditions were similar, indicating little change in decoding accuracy across levels of shyness. The predictor variable of moving toward others (dependency/pleasing others) had a unique interaction effect. Participants low in dependency/pleasing others decoded nonverbal cues significantly more accurately than participants high on this trait *only* when they were in the low self-consciousness condition. For the high self-consciousness and the control conditions, participants low in dependency/pleasing others decoded nonverbal cues significantly worse than participants high on this trait. These results will be further discussed below.

Personality Variables

Extraversion. Past researchers have suggested that extraverts, due to their greater social experience, are more able to detect subtleties in nonverbal cues than introverts (Akert & Panter, 1988; Allport, 1924; Sapir, 1958). While extraverts find rewards in social involvement and other arousing activities, introverts experience the opposite (Eysenck, 1997). The claim that extraverts outperform introverts in nonverbal communication was refined by Lieberman and Rosenthal (2001), who found that extraverts decoded nonverbal cues more accurately than introverts *only* when the decoding task was a secondary goal of an interaction. Lieberman and Rosenthal (2001) found no significant difference in decoding performance between extraverts and introverts when the decoding task was the primary goal.

In the present study, the decoding task was the primary goal, but highly extraverted individuals decoded significantly worse when they saw a large version of their face on the computer screen—the high self-consciousness condition—than when they saw only a very small version or no face at all. This interaction effect suggests that highly extraverted individuals were paying more attention to their face, when displayed prominently on the computer screen, than to their decoding task. This is not surprising, as extraversion and self-admiration have been found to be significantly correlated (Emmons, 1984), and a recent study reported that more extraverted individuals rated their profile picture on Facebook higher than less extraverted individuals (Ong et al., 2010). Similarly, extraverts have been found to strongly value their physical appearance (Vazire, Naumann, Rentfrow, & Gosling, 2008), and the significant correlation reported between extraversion and narcissism suggests that extraverts may possess one of the narcissistic characteristics—an excessive concern over their personal appearance (Raskin & Hall, 1981; Wink, 1991). Thus, in the present study those higher in extraversion may have been motivated to look at their prominently displayed faces more than those low in extraversion. Looking periodically at one's face means one is not looking at the decoding task; therefore, one's face becomes a distractor.

Therefore, in the high self-consciousness condition, looking at one's face may have become a "primary goal," while the decoding of the nonverbal cues became the secondary goal. In this case, the results of the present study do not replicate those of Lieberman and Rosenthal (2001); greater extraversion did not lead to more accurate nonverbal decoding when perceivers were somewhat distracted from their decoding task. This lack of replication is particularly interesting given that the present study employed a more ecologically valid "distractor" stimulus than the prior study. Future research should explore how distractors of different types affect the processing of nonverbal communication.

Sociability. Sociability indicated the same pattern of effects on decoding accuracy, as did extraversion. Under the no manipulation (control) condition, highly sociable individuals outperformed less sociable individuals on both the METT and the VNDT. These results replicate Young and Brunet's (2011) findings. In their study, sociability was significantly related to decoding accuracy only in the "brief presentation" condition, with highly sociable individuals significantly more accurate than those who were low in sociability. Their brief presentation condition is analogous to the use of the METT in the present study. In addition, the present findings expand upon those of Young and Brunet (2011) by indicating the same effect for sociability for the VNDT, a very different decoding task. Thus, the present findings, combined with those of Young and Brunet (2011), suggest that the relationship between sociability and nonverbal decoding accuracy is robust.

Unlike Young and Brunet (2011), the present study also manipulated self-consciousness; the present results indicate that the relationship between sociability and nonverbal decoding accuracy becomes more complicated under certain circumstances. In the high and low self-consciousness conditions, highly sociable individuals performed significantly worse on the METT and marginally worse on the VNDT, as compared to less sociable individuals.

Sociability is strongly associated with extraversion (Hampson, Andrews, Barckley, & Peterson, 2007; Ippel & Feij, 1978) and significantly correlated with various aspects of narcissism (Raskin & Terry, 1988; Wink, 1991). However, it is possible that highly sociable participants in the present study had a different reason from that of highly extraverted participants for their relatively poor decoding performance when confronted with the high or low self-consciousness manipulations. Sociability is considered a highly desirable characteristic in the U.S. (Emiliani & Molinari, 1988; Parmelee & Werner, 1978; Rushton & Irwing, 2011), and past studies have shown that highly sociable people are rated as more desirable and attractive than less sociable people (Cunningham, Barbee, & Pike, 1990; Meier, Robinson, Carter, & Hinsz, 2010; Snyder, Tanke, & Berscheid, 1996;). Past research has shown that sociability significantly correlates with a high need for affiliation, suggesting that highly sociable individuals in the present study may have paid extra attention to their faces on the computer screen not because of their high self-admiration, but rather because of their need to be perceived as socially desirable. Highly sociable individuals may have looked at their faces because they cared about how they would be perceived by others (e.g., the experimenter). Recall that participants in the high and low self-consciousness conditions were told that the experimenter would later be "coding the video of their facial expressions." Thus, these participants knew that they would have a future "audience," making evaluative judgments of them, and this knowledge may have increased their concerns about social desirability and harmed their performance on the decoding tasks.

Shyness. In conjunction with the discussion of extraversion and sociability, the results of the present study offer a new perspective for understanding the role of shyness in decoding accuracy. Highly shy individuals decoded nonverbal cues significantly better than less shy individuals when in the high self-consciousness condition, while the opposite pattern was found for extraversion and sociability. One possible explanation is that highly shy individuals may have experienced strong embarrassment when they saw their faces on the computer screen, which may have made them direct their attention only to the decoding task. In comparison, highly extraverted individuals and highly sociable individuals may have enjoyed looking at their faces on the screen, which may have made them pay less attention to the decoding task. Embarrassment is a defining issue for shy individuals while it is not for not-shy individuals (Crozier, 2001; Zimbardo, 1977). Many shy individuals strategically avoid anxiety-producing situations (Borkovec, Robinson, Pruzinsky, & DePree, 1983; Miller, 1996; Zimbardo, 1977); highly shy individuals in the present study may have avoided looking at their faces on the computer screen because it made them anxious.

Embarrassment could also explain why no discrepancy in decoding performance was found between highly shy individuals and less shy individuals under the control condition. Unless self-consciousness is triggered, the present data indicate that highly shy individuals perform equally well on decoding tasks as less shy individuals. This finding replicates a number of past studies on shy individuals' decoding accuracy (Akert et al., 2009, 2010; Young & Brunet, 2011). A discrepancy in decoding performance occurs only when highly shy individuals feel self-conscious, as when seeing their faces prominently displayed on the computer screen. This display may make them avoid the source of embarrassment—their faces—and focus their attention even more on the decoding task.

In addition, the attention of highly shy individuals appears to shift from themselves to others when their self-consciousness is increased. When self-consciousness is increased, highly shy individuals' attention may be consumed by decoding other people's nonverbal cues, which in turn reduces their attention to their own encoding performance. In the same manner, highly sociable individuals' attention may be consumed by their own encoding performance, which would result in less attention paid to their communicator's nonverbal cues. It is possible that increased self-consciousness turns on a switch in opposite directions for an extravert/sociable individual and for a shy individual. For everyone, self-consciousness evokes an awareness of self-presentation (Carver, 2003; Duval & Wicklund, 1972). However, individuals high in extraversion or sociability may care more about how well *they* think they are presenting themselves to others, while individuals high in shyness may care more about how well *others* think they are doing. That is, it may be the difference between: "How well am *I* doing?" and "How do *you* think I am doing?" For example, when self-consciousness is increased during a social interaction, extraverted or sociable people may focus more on how well they articulate their thoughts, by paying extra attention to their encoding performance. On the other hand, shy individuals may focus more on how well listeners understand or agree with what they say, by paying extra attention to their conversational partners' nonverbal cues. Future research should consider other ways of increasing self-consciousness among highly shy individuals to understand how this emotion affects their decoding performance.

Moving Toward Others. The present study found interesting results for the domain of moving toward others ("dependency/pleasing others"). Individuals high on the trait performed similarly on both of the nonverbal decoding tasks regardless of their experimental condition. However, individuals low in dependency/pleasing others performed differently across the experimental conditions. When individuals low in moving toward others were aware that their face was being recorded, but it did not appear on the computer screen, they performed significantly better than the other two groups. This interaction effect indicates that individuals low in moving toward others may have been more motivated to perform well on the nonverbal tasks when their self-consciousness was *slightly* evoked. For these individuals, a high level of self-consciousness made them too uncomfortable: they performed worse on the decoding tasks when their whole face appeared on the computer screen while completing the tasks.

For individuals low in dependency/pleasing others, increased self-consciousness—which acts similarly as a stressor—enhances performance *only* if it is low to moderate. For example, Harvey, Clark, Ehler, and Rapee (2000) found that individuals who saw themselves in a videotaped recording before they gave a public presentation performed significantly better than others who did not see the video recording of themselves. Individuals low in moving toward others may have felt assured by first confirming how they appeared on a computer screen, and then comforted that they would not see their face again while completing the nonverbal decoding tasks.

Prior research has indicated that individuals who score low on this trait are less dependent on others for emotional support, feel less need to please others, and show less compulsive compliance than individuals high in moving toward others (Cheek & Krasparova, 1999). In addition, they exhibit neither excessive dependence nor excessive self-sufficiency in their interpersonal relationships (Cheek & Krasparova, 1999). In the present study, low-scorers on dependency/pleasing others may have perceived the nonverbal decoding tasks as a test of their general competency, and thus the low self-consciousness condition may have motivated them to perform well on the tasks—just as they would want to do well on any other type of test.

Across all conditions, individuals high in dependency/pleasing others were better decoders than individuals low on this trait. This makes sense logically: the more one depends on others emotionally and wants to please them, the harder one will look for clues in others' nonverbal behaviors, which in turn would lead to higher decoding accuracy. Past research indicates that individuals high on the sociotropy items of the PSI want to make others happy in order to gain various psychological resources—such as affection, acceptance, identity and guidance (Pincus & Gutman, 1995). Because these individuals rely upon others to experience positive emotions, they are more prone to develop depressive symptoms when their interpersonal needs are not met or when they lose psychological resources (Pincus & Gutman, 1995).

Although there is a link between depressive symptoms and dependent attachment style, not all dependent attachment styles are unhealthy. Bornstein (2005) defines *unhealthy dependency* as "intense, unmodulated dependency strivings that are exhibited indiscriminately and reflectively across a broad range of situations," while *healthy dependency* is defined as "dependency strivings that are exhibited selectively (i.e., in some contexts but not others) and flexibly (i.e., in situation-appropriate way)." Future studies should examine different dependent attachment styles and corresponding nonverbal decoding accuracy. Some individuals high in moving toward others may not decode well if a context or situation changes. For example, an individual high in healthy dependency may decode quite well if he or she had a terrible life event and needs emotional support, while the same person may not decode as well in a regular social setting.

Decoding Tasks

The METT and the VNDT. The present study found several significant interaction effects between personality variables and levels of self-consciousness decoding accuracy, with more interaction effects found for the METT than for the VNDT. This difference in the results for the two distinctive nonverbal decoding tasks suggests that decoding accuracy was more susceptible to how well individuals *noticed* the subtleties of nonverbal cues than to how well individuals *interpreted* the meaning or significance of these nonverbal cues. Because the METT presents subtle nonverbal cues for only 40 milliseconds, participants were likely to miss the pertinent nonverbal cues if they were looking at something else—such as their face. On the other hand, the VNDT offers multi-channel nonverbal cues for a minute per videotaped scene, which gives viewers more opportunities to notice subtle nonverbal cues. The whole point of naturalistic, multi-channel nonverbal decoding tasks—such as the VNDT—is that useful nonverbal information is typically diffused across each scene. There are multiple nonverbal pieces of information that can help the perceiver decode the meaning of each scene accurately (e.g., Archer & Akert, 1980). Therefore, participants in the present study may have been able to decode the VNDT scenes accurately even if they occasionally looked away from the scene to look at their faces on the computer screen, a strategy which would not have worked as well with the METT.

Moreover, the VNDT provides social context in addition to nonverbal cues. Because the VNDT is a multi-channel decoding task that uses real-life and naturally occurring nonverbal cues (as opposed to the posed facial expressions of emotions in the METT), it measures the *attributions* people form about complex social interactions based on the attendant nonverbal cues, rather than on how well people notice and label one briefly presented facial expression. This distinction in measurement explains the results of the present study: personality variables had a more significant effect on the METT than on the VNDT. This distinction may also explain why the effect of personality variables on decoding accuracy has produced such mixed results in past studies (e.g., Ambady et al., 1995; Hall et al., 2009; Riggio & Friedman, 1982; Schroeder, 1995). If the discrepancy in decoding performance is rooted in how well individuals recognize nonverbal cues (e.g., posed facial expressions of emotions), instead of how accurately individuals attribute meaning to the emotion or other information provided by nonverbal cues, then the VNDT would be less likely to produce the significant results. Future studies should select which aspect of decoding performance—that is, noticing or interpreting nonverbal cues—is of importance when they choose measurements of nonverbal decoding ability. In addition, future studies should consider carefully the external or ecological validity of their nonverbal measures. For example, Lieberman and Rosenthal (2001) used the audio portion of the PONS, which is composed of posed scenes. More useful measures of nonverbal decoding ability would utilize scenes of realistic social interaction.

Limitations and Directions for Future Research

The present study had several limitations. First and foremost, the decoding tasks did not include any encoding portion of nonverbal communication, although people decode *and* encode simultaneously in the real life. For example, when people listen to someone else, they recognize and interpret the other's nonverbal cues, which is the decoding portion; they also express their emotions by nodding, gazing, gesturing, and so on, which is the encoding portion. In a social interaction, decoding and encoding are interdependent; how people decode nonverbal information affects how they encode nonverbal information, and vice versa. Therefore, an effective decoding task should include both the decoding and the encoding portions of nonverbal communication. Thus, a "gold standard" design in this area would require the participants to decode the nonverbal communication of another person while they are actively engaged in a real conversation with that person.

Second, the nonverbal tasks used in the present study relied on computers; the participants were not engaged in any real, reciprocal communication. In real life, how well people decode nonverbal cues depends on the combination of many factors: for example, physical factors (e.g., fatigue), external factors (e.g., social settings and ethnicity of the communicator), and internal factors (e.g., personal characteristics and mood), all of which would interact with each other to influence one's decoding performance. For example, some highly shy individuals might exhibit shy characteristics only when they were in a particular setting (e.g., public speaking), or talking to a particular individual (e.g., the opposite sex), or in a particular environment (e.g., an unfamiliar place). The interactions among these factors need to be considered for a better understanding of what affects decoding accuracy.

Third, in the present study, participants' faces were shown to them on their computer screen, briefly in the case of low self-consciousness condition, and continuously in the case of high self-consciousness condition. In addition, in the high self-consciousness condition, the live-recording of their face was prominently displayed on the computer screen. Thus, it is the case that this facial image served as a visual distraction for those in the high condition, while those in the low and control conditions did not have any form of visual distraction. This was the point of the self-consciousness manipulation; however, one could argue that it was "distraction" and not the psychological effect of seeing their own faces that affected their decoding performance. In order to rule out this explanation, future research could compare decoding performance when the visual distraction is one's face, or someone else's face, and/or some other visual stimulus.

Fourth, future research using this paradigm should include a measure of participants' eye gaze while they look at their computer screens. Recall that the present study suggests that extraverted and highly sociable people looked frequently at their faces while shy participants refrained from doing so. In order to determine where participants are gazing during the nonverbal tasks, an infrared eye-tracking device should be employed.

Finally, the participants in the present study consisted of students at an all-women's college: the sample does not represent the whole population. The participants most likely had competent communication skills upon entering Wellesley College in the first place. In addition, Wellesley students are highly motivated and competitive. When they are given tasks in which a correct answer is attainable, they will be motivated to attain it. While in the present study the predictor variables had an effect on decoding accuracy, the effects may be stronger in the general population, where people are less likely Wellesley students.

The present study offers a wide range of new perspectives for understanding individual differences in decoding accuracy, as well as for designing research in nonverbal communication. Personality characteristics or the levels of self-consciousness alone do not explain the discrepancy in individuals' decoding performance. Instead, these data indicate that a combination of both best describe who is a "skilled" decoder of nonverbal cues. It is important that future research takes into account physical, external, and internal factors in order to examine their impact on decoding accuracy.

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