THE EFFECTS OF AFFECT VALENCE AND NONVERBAL CHANNEL ON AUDIENCE DETECTION OF EMOTION

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This study investigated the degree to which affect valance and nonverbal channel influence the accuracy of emotion detection. Participants included 120 undergraduate students who completed both the vocal and facial portions of the Emotion Recognition Index. Preliminary analyses revealed the highest accuracy rate (98.33%) for positive emotions displayed through facial expressions while positive emotions displayed through vocal cues yielded the lowest accuracy rate (40.56%). Negative emotions were most accurately detected through vocal cues (66.55%) followed by facial expressions (63.67%). Given the results of these accuracy scores, a factorial ANOVA was conducted for the interaction of affect valence and nonverbal channel. This resulted in an interaction affect accounting for 40% of the variance in emotion detection accuracy.

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The ability to detect emotion has played a major role in the human evolutionary process. Through the detection of emotion, we are able to predict, prepare for, and better interpret the actions of others (Dillard & Wilson, 1993). Consequently, the forthcoming actions and reactions of others can be better estimated once we have detected their emotional states. This observation also provides information regarding how others perceive us. Through the predictions made from information gathered when detecting emotions, we are better able to prepare for future encounters. As a result of these functions, detecting emotion grants us the ability to create and sustain social ties and thus aids in our survival (Buck, 1991; Darwin, 1965; Dillard & Wilson, 1993). However, emotion detection is only as helpful as the degree to which our detections are accurate. Without being able to accurately assess the emotional state of another, we are less capable of utilizing the aforementioned functions of emotions (Buck, 1991). That is, when emotions are decoded inaccurately, estimations of the future actions of others will be incorrect. You cannot be adequately prepared for future interactions with an individual if you have misinterpreted the emotions they were conveying. Therefore, if emotions are interpreted inaccurately, the decoding of emotion will be unable to serve its primary purposes (Buck, 1991; Dillard & Wilson, 1993).

Certain factors influence the degree to which emotions are decoded accurately. For example, according to Leathers and Emigh (1980), the means through which the emotion is expressed, as well as the nature of the emotion itself, influence decoding accuracy. In terms of how the emotion is expressed, previous research has shown that different nonverbal channels convey varying amounts of information (Leathers & Emigh, 1980; Dittman, 1972). Two channels that have proven to display ample emotional information are *facial* and *vocal cues*

(Gallios, 1993). However, researchers have yet to reach conclusive results regarding how decoding accuracy varies specifically between these two channel types (Leathers & Emigh, 1980). Therefore, this study looks at decoding accuracy as a function of whether the emotion is communicated through facial expressions or vocal cues. Additionally in terms of the nature of the emotion, researchers have shown that the *affect valence* of an emotion (i.e., whether the emotion is positive or negative) affects the accuracy of detection. Researchers have consistently concluded that positive emotions are decoded more accurately than negative emotions (Leathers & Emigh, 1980; Gallios, 1993), however how decoding accuracy is affected by a combination of both affect valence and the nonverbal channel (i.e. facial and vocal cues) has yet to be established. Therefore, the primary goal of this project is to determine how affect valence and nonverbal channel conjointly influence decoding accuracy.

Theoretical Perspective

Buck's (1991) Read Out Theory of emotion provides a useful framework for which to view the detection of different emotional states through nonverbal channels. The theory details specific aspects of emotion, identifies factors that go into the display and interpretation of emotion, and highlights nonverbal channels as the key avenue through which emotions are detected. Buck contends that emotions can be conceptualized through the understanding of three important readout aspects. First, emotions are connected to homeostasis maintenance and the body's ability to adapt. As a result, internal physiological and neurological events at work during the experience and expression of emotion are a type of readout called Emotion I. A second type of readout maintains that emotions are frequently expressed in an external manner thereby providing others access to emotional states. These external expressions consist of emotional displays through nonverbal channels that are apparent to others and are called Emotion II. The third readout details the subjective experience of emotions as an internal cognitive readout. This aspect emphasizes the individual's awareness of their own emotions as they are being experienced and is called Emotion III. Consequently, Buck's read out theory accounts for physiological, behavioral, and psychological dimensions of human emotion.

The current study focuses on emotional phenomena associated with Buck's second read out, or Emotion II, highlighting the external readout of emotion. One premise of readout theory contends that spontaneous emotions are interpreted most accurately through the reading of nonverbal cues. These cues include all forms of nonverbal behavior, but most importantly as it relates to this study, these cues include vocal and facial cues. This study aims to extend the claims of this theory by examining how vocal and facial cues specifically influence the accuracy of detection. While nonverbal channels produce the most accurate interpretations of emotions, it has yet to be seen how specific channels differ in their ability to produce decoding accuracy.

Communication of Emotion

The communication of emotion is a vital part of our ability to adapt and thrive as human beings (Darwin, 1965). According to Darwin (1965), *emotions*, defined as clusters of reactions that have evolved to fulfill a shared evolutionary purpose, serve in the creation and maintenance of social order. (Buck,1990; Darwin, 1965). They help to initiate and maintain social bonds and to signal situations that could result in negative outcomes (Buck, 1990; Darwin, 1965). In other words, communication of emotion has helped species to both survive through facilitation of social ties, and thrive due to its aiding in the avoidance of danger. These capabilities can be further explained by looking at how the communication and decoding of emotions serves us as human beings. This study aims to determine how the variables of *affect valence* and *nonverbal channel* affect this process of emotional communication. Emotions influence how we relate to other people (Dillard & Wilson, 1993). We observe and evaluate other's emotions in order to determine the current state of our interpersonal relationships and to construct fulfilling and satisfying new relationships (Leathers & Emigh, 1980). According to Dillard and Wilson (1993), emotional communication serves three main functions. First, the communication of emotion helps us to foresee the reactions and actions of others. That is, through the observation of an individual's emotional state, we are better able to predict the individual's actions that may follow. Emotions are able to do this by clarifying the individual's expectations and intentions (Leathers & Emigh, 1980). For example, if an individual is communicating the emotion of frustration, you can infer that their current expectations are not being met. In this case inferences about intention, such as whether the individual might be intending to give up hope of meeting their expectations, or if the individual intends to try a new approach to meet their expectations, can also be made. A second function that the communication of emotion can serve is to prepare us for future interactions with an individual. Evaluating an individual's current emotional state can give insight into how situations will play out in the future. For example, if a person communicates happiness when they see you, you may infer that future interactions with that person will be pleasant and positive due the positive emotions they expressed. Thirdly, emotions are able to leak evidence as to how others perceive us. Such as in the example above, the individual likely perceives you in a positive way, and thus shows positive affect towards you.

In addition to the three functions described by Dillard and Wilson (1993), an additional function of emotional communication is revealed in the *process* of emotional communication. As stated earlier, Buck's (1991) Read Out Theory suggests that the emotional state of a communicator is displayed spontaneously and impulsively. This display is then received and interpreted by the communicative audience. Because the display is typically read as impulsive and thus genuine, receivers of the emotional expression read the display and assign meaning to it. Buck contends that we view emotions of others by essentially observing the readout of his or her motivation. Thus, an additional function of emotion is performed when receivers are able to make judgments about the motivations of others through the readout of their emotions.

Interpretation Accuracy

In order for the interpretation of emotions to serve these purposes, the emotions themselves must be interpreted accurately. The communication of certain basic emotions, such as fear, happiness, sadness, disgust, surprise, contempt, and anger is noted as largely universal, regardless of culture or context (Ekman, 1982). However, this does not mean that these emotions are always interpreted correctly. *Emotion perception competence* refers to one's ability to interpret the emotions of others accurately (Scherer & Scherer, 2011; Scherer, 1984). The higher the emotion perception competence, the more likely it is that emotions will be interpreted correctly (Scherer, 1984). Only when this competence is at a high level are individuals able to infer reactions and predict action tendencies accurately from the reading of emotions. This competence enables us to gather information about an individual's reaction to our behavior, and thus is vital in order to manage interactions with others (Scherer & Scherer, 2011).

Affect Valence

While emotional perception competence contributes to the process of emotional communication, the type of *emotional affect* experienced influences this process as well (Batra & Ray, 1986). *Affect* is a term used to encapsulate not only the emotions felt by an individual, but also the individual's moods and drives (Batra & Ray, 1986). Before affect can have an influence on the process of emotional communication, its valence must first be established. In fact, valence is a known crucial component of affect (Dillard & Wilson, 1993). Scholars have even argued that feelings are best conceptualized according to valence, which includes positive and negative dimensions (Russell, 1980; Watson & Clark, 1992). This conceptualization is beneficial because when looking at emotional detection in relationship to other factors, valence can account for more variance than a specific emotion alone would (Watson & Clark, 1992).

The valence of an individual's emotion is determined through the evaluation of his or her relationship to the current environment (Sherer, Schorr, & Johnstone, 2001; Shen & Bigsby, 2010). Darwin (1965) argues that emotions not only arise through this evaluation, but they arise due to reoccurring adaptive problems. These problems are attributed to personal incongruencies found within one's environment (Shen & Bigsby, 2010; Darwin, 1965). A *negative valence* of affect occurs when an individual perceives the environment to be at odds with his or her individual goals, whereas a *positive valence* occurs when an individual perceives that the environment is likely to assist in the achievement of his or her goals (Scherer, 1984; Shen & Bigsby, 2010). Therefore, emotions such as fear, sadness, anger and disgust manifest when the environment contrasts with an individual's goals. Fear arises when a person is faced with a threat, sadness when faced with a loss, anger when faced with an offense, and disgust when faced with something indigestible (Shen & Bigsby 2010). Alternatively, emotions such as happiness arise when an individual's goals do align with his or her environment (Shen & Bigsby 2010).

Emotional valences function to aid in their solution (Shen & Bigsby, 2010). Negative emotions spur the mobilization of resources in an attempt to realign the environment with the individual's goals (Levenson, 1994). Positive emotions help to stabilize the individual back to the state they were in before the arousal. This stabilization aids in preparing the individual for the adaptive problems yet to come (Levenson, 1994). Through the occurrence of adaptive problems, emotions arise and establish valence, and even produce solutions to these problems. This study will look at affect valence using the universal emotions identified by Ekman (1982). Positive emotions will be conceptualized by looking at accuracy of detection in displays of happiness. Happiness is the single positive emotion found to be universally recognizable across cultures. Accuracy of detection for negative emotions will be calculated by averaging accuracy scores for the universal emotions of fear, sadness, disgust and anger.

The valence of emotion has a great impact on the accuracy of assessment (Batra & Ray, 1986). Scholars have commonly cited positive affect as more accurately interpreted than negative affect (Gross, John, & Richards, 2000; Gallios, 1993; Gross & John, 1995; Leathers & Emigh, 1980). Further, while individuals are typically able to recognize basic human emotions in others, their ability to do so for emotions of happiness is the highest (Gallios, 1993). Emotions other than happiness are cited as being more difficult to decode (Gallios, 1993). The reason for this has been attributed to several factors. One explanation is the fact that there are more negative emotions (e. g. fear, anger, sadness, etc.) than there are positive emotions (e.g. happiness) that have been identified as universal (Ekman, 1982). Therefore, negative emotions are easier to confuse and thus be detected incorrectly, than are positive emotions (Gallios, 1993). Another explanation for this is that expressions of negative emotions are more restricted than are expressions of positive emotions (Gross, john & Richards, 2000). When asked which emotions they attempt to conceal on a daily basis, individuals often cite negative emotions such as sadness and anger (Gross, 1998; Gross & John, 1995). Due to the fact that they are not commonly expressed, these negative emotions are then harder to recognize even when they are being expressed (Gross, 1998; Gross, John & Richards, 2000). For example, Leathers and Emigh (1980) assessed three different groups of people in their ability to detect emotions correctly through the viewing of photographed expressions. In all three groups, photographs depicting happiness received the highest percentage of correct identifications (Leathers & Emigh, 1980). While this previous research has established the influence of positive affect on decoding accuracy, facial cues have been the primary nonverbal channel used when assessing this connection. In light of these results and others like them, the current study attempts to add support and expand these findings by analyzing the extent to which affect, either negative or positive, is accurately detected via vocal and facial nonverbal channels. Based on previous research, the researcher believes that positive affect will be more accurately detected through these channels than negative affect. Therefore the following hypothesis is presented:

H1: Audiences will detect positive affect more accurately than negative affect via vocal and facial cues.

Nonverbal Channel

The most common avenue for emotional expression is that of nonverbal communication (Ekman, 1982; Leathers, 1986; Scherer & Scherer, 2011). Nonverbal communication is relied on more heavily for interpretation of emotions than verbal communication (Leathers, 1986). The two channels most commonly noted in their ability to convey nonverbal communication are *facial expressions* and *vocal cues* (Mehrabian, 1981). Therefore this study will examine the interpretation of affect valence of emotion communicated through the nonverbal channels of voice and facial expressions.

Many scholars have cited facial expressions as the most widely utilized channel to signal emotions to others (Ekman & Friesen, 1975; Leathers & Emigh, 1980). Beginning with Darwin's work in *The Expression of the Emotions in Man and Animals* (1965) many researchers have claimed the universality of these facial expressions (Kappas, 1997). The emotions expressed through facial expressions are generally the same for all human beings, and are therefore likely to be biological in nature (Ekman, 1982; Darwin; 1965; Buck, 1985). The basic emotions expressed through facial expressions that are thought to be innate include happiness, surprise, fear, anger, sadness, and disgust and contempt (Ekman, 1982; Leathers & Emigh, 1980). The face is in fact cited as the most valuable source of information regarding these basic emotions (Leathers & Emigh, 1980).

Second only to facial expressions, vocal cues are able to transmit 38 percent of information regarding an individual's emotions when communicating (Mehrabian, 1981). Vocal cues constitute the semantic components of sound (Leathers, 1986). These components include pitch, rate, volume, quality, duration, regularity, articulation, pronunciation and silence (Leathers, 1986), and they are used to serve several different functions (Leathers, 1986). For example, certain arrangements of these semantic components can be used to communicate liking or disliking, control, dominance and submission tendencies, and even personal information such as sex or race (Scherer, 1982; Leathers, 1986). Perhaps one of the most important uses of vocal cues is the communication of emotion (Scherer & Scherer, 2011). Similarly to facial expressions, the emotions expressed by vocal cues are likely universal (Scherer, 1988). Vocal cues have the ability to convey emotions regardless of language or dialect (Scherer, 1988). A leader in the study of nonverbal vocal communication, Scherer was the first to code the acoustic features of the voice (1988). These features were then found to be related to the expression of basic emotions, and have since been used to study the vocal expression of emotion (Scherer, 1988). Davitz and Davitz (1959) also conducted studies of vocal expression proving that individuals can identify beyond chance the emotions conveyed by vocal cues.

The ability of both vocal and facial avenues to communication emotion is clear. However, determining which types of cues (facial or vocal) elicit greater accuracy when identifying emotions is less clear. While scholars argue that nonverbal channels differ in their ability to communicate information, conclusive evidence as to how they differ has yet to be reached (Leathers & Emigh, 1980; Dittman, 1972). Some studies have presented findings that support facial expressions as easier to decode, while others found facial expressions to be a less effective channel of communication. For example, Wickline, Bailey and Nowicki (2009) performed a study looking at whether an in-group advantage existed for detecting emotions through facial expressions. Participants of either European or African descent were exposed to photographed facial expressions and recorded vocal cues of both European and African actors displaying different emotions. Decoding accuracy scores were calculated for each culture group and both nonverbal channels, results showed a main effect for culture in-group advantage when detecting emotion, but did not find any significant effects for nonverbal channel. In this case, decoding accuracy did not vary between nonverbal channels of vocal and facial cues. A study done by Shaprio (1972) found that emotions displayed through the nonverbal channel of body language resulted in greater decoding accuracy than did those displayed through facial expressions. Participants were shown pictures of an individual from the neck up, of their entire body, or from the neck down. From these pictures participants were able to make accurate judgments about the specific emotion on display. However, results found that body language (pictures from the neck down) was a much strong predictor of decoding accuracy than were facial expressions (pictures from the neck up). This study gives one example of facial cues inferiority to other nonverbal channels in facilitating accurate detections. The present study aims to discover what the superiority relationship, if any, exists between facial and vocal cues. Still other studies have found results that link the ability of a nonverbal channel to lead to decoding accuracy with factors of personal preference. In a study done by Vande Creek and Watkins (1972) participants viewed video clips featuring a stress conflict perpetuated either by modes of high verbal stress and low nonverbal stress, or low verbal stress and high nonverbal stress. Participants were asked to rate the clips overall as either containing high or low stress. Because the modes of communication did not correlate in stress level, participant answers revealed which channel of nonverbal communication was used to assess emotion. Results found that participants differed in their ability to decode nonverbal and verbal emotions due to preference for a certain communication channel. Those who preferred verbal channels were more accurate at detecting stress in clips with high verbal stress. Likewise those who preferred nonverbal channels decoded clips with high nonverbal stress more accurately than those with high verbal stress. This study lends to the idea that decoding of emotions may be influenced by personal preference. One channel was not chosen as more favorable over the other; both vocal and facial cues had the potential for preference. While individual differences may be at play, it is important to first establish what the overarching effects of nonverbal channel alone have on the ability to detect emotion. It is important to establish base knowledge of how communication channels affect accuracy detection before we can attribute those differences to other factors. Therefore, in an effort to shed more light on these inconclusive results, this study puts forth the following question:

> RQ1: To what extent will audience detection of speaker affect differ by nonverbal channel (i.e., facial and vocal)?

Method

Participants

The sample consisted of 120 undergraduate students at a medium-sized, private university in the southwest. Participants were undergraduate students enrolled in an undergraduate basic communication studies course.

Procedures

After securing informed consent, participants completed the Emotion Recognition Index (ERI) (Scherer & Scherer, 2011). This instrument was facilitated by an instructor on a large project screen (as described below). Participants responded to a series of 30 slides depicting facial expressions of anger, fear, happiness, sadness, and disgust. After the slide-viewing portion of the ERI, participants heard a series of 30 audio clips containing angry, fearful, happy, sad and neutral vocal cues. All participant responses were recorded on an optic scan (Scantron) data form. Participants completed the instrument on a voluntary basis and were awarded course credit for participation in the research. Students who did not elect to participate were offered an alternative assignment in order to earn identical course credit. All participation took place during class time. The survey was completed anonymously. The instrument took approximately 30 minutes to complete. Afterwards students were thanked for their participation and debriefed.

Measures

Both nonverbal channels (vocal cues and facial expressions) and affect valence (positive and negative) were measured using the Emotion Recognition Index (Scherer & Scherer, 2011). The ERI consists of 30 photographs selected from the pool of 65 still photographs that were published by Ekman and Friesen (1976). Each photograph is of an actor from the neck up displaying one of 5 emotions (fear, anger, sadness, disgust, or joy). Each photograph is shown for 3 seconds. Once the photograph flashed on the screen, participants recorded onto a Scantron which emotion was displayed. The Scantron gave 5 letter options, A, B, C, D, and E. Each emotion was paired with a corresponding letter on the Scantron. That is, letter A Corresponded with Anger, B with fear, C with Joy, D with sadness and E with disgust. A large, easily readable key of the Scantron letter choices and corresponding emotions for this facial section was present on the wall next to the projector screen. Respondents were given ample time to record answers after each picture was presented. However, participants were encouraged to answer in a fast and spontaneous manner. This was to ensure that students were recording answers that were mainly instinctive. Two example photographs were shown before students began the actual instrument to help familiarize them with the process. After all 30 photos had been shown, participants moved onto the second portion of the instrument.

The vocal section of the instrument consists of 30 short audio clips. Each clip is of an actor reciting one of two sentences using a certain emotional inflection. In order to ensure participants concentration on the vocal aspects of the clip, as opposed to the words used in the clip, these clips were recorded in an unknown language. The language was made using phonic sounds from 6 different European languages. The emotional inflection was used to display one of emotions: anger, fear, sadness, joy, or neutral. Neutral audio clips depicted actors using no emotional inflection. Each clip was only played twice. After each clip participants were instructed to record they thought was displayed onto their Scantron. The letter choices for this section were identical to those in the first section, with the exception of Letter E, which correlated with Neutral instead of disgust. A second large, easily readable key of the Scantron letter choices and corresponding emotions for the vocal section was present on the wall next to the projector screen. Again respondents were given ample time to record answers after each picture was presented. However, as in the first section, participants were encouraged to answer in a fast and spontaneous manner. Two example audio clips were played before participants began the second section to help familiarize them with the process.

Affect valence was accounted for using the ERI as well. All the negative valence items for the facial portion (sadness, fear, anger, disgust) and the vocal section (sadness, fear, anger) were averaged together to produce a single accuracy score. This score represents the percentage of correct responses. The positive valence items for the facial portion (joy) and vocal portion (joy) were given an accuracy percentage score as well.

The ERI was selected for this study because it has demonstrated acceptable levels of reliability and has met theoretical expectations in previous research (Scherer & Scherer, 2011). In the current study, the ERI also yielded acceptable levels of internal consistency (see Table 1).

Data Analysis

A 2x2 factorial analysis of variance was performed in which nonverbal channel (vocal and facial) and affect valence (positive and negative) served as predictors of detection accuracy.

Results

Means and standard deviations for each subscale of the ERI appear in Table 1. Internal consistency estimates for the facial (KR20= .82) and vocal (KR20=.83) sections of the ERI were acceptable.

Results of a 2 x 2 factorial ANOVA, in which affect valence (positive v. negative) and nonverbal channel (facial v. vocal) served as predictors of detection accuracy revealed a single main and one interaction effect. Specifically, detection accuracy differs with respect to nonverbal channel ($F_{1,116}$ = 159.90, p<.05, partial eta squared = .334). Indeed, an inspection of the descriptive statistics for nonverbal channel shows that the participants in this study detected facial cues (mean = 69.22, standard deviation = 11.07) more accurately than they did vocal cues (mean = 61.73, standard deviation = 10.90). Although differences in detection accuracy attributable to affect valence were not significant ($F_{1,116} = 3.84$, p=.053, ns), a strong interaction effect between the two independent variables was obtained ($F_{1,116} = 187.90$, p<.05, partial eta squared = .407). That is, positive valence facial expressions were detected more accurately (*M* = 98.33, *SD* = 6.34) than negative valence facial cues (mean = 63.67, standard deviation = 8.58). Conversely, negative vocal cues were detected more accurately (mean = 66.55, standard deviation = 9.82) than positive vocal cues (mean = 40.56, standard deviation = 9.42). Therefore, it appears that the detection accuracy for human emotion is a function of an interaction between the nonverbal channels used to express those emotions (i.e., facial versus vocal) and the valence of those emotional expressions.

Table 1. *Means and Standard Deviations of Detection Accuracy for the Facial and Vocal Subscales on the Emotion Recognition Index*.

ERI Subscales	Means	Standard Deviations
Facial Cues		
Anger	41.32	16.80
Fear	68.43	15.88
Joy	98.33	6.34
Sadness	74.68	18.80
Disgust	80.85	26.64
Overall Facial	69.22	11.07
Vocal Cues		
Anger	64.92	18.28
Fear	63.67	18.18
Joy	37.55	19.36
Sadness	75.87	15.46
Neutral	64.07	10.96
Overall Vocal*	61.73	10.90

Neutral vocal cues were not used in the current study to compute positive or negative affect. Therefore, the means and standard deviation for Overall Vocal cues does not reflect neutral vocal cues.

Discussion

The goal of this study was to determine how affect valence and nonverbal channel affect the process of emotional communication. Results of the study suggest that nonverbal channels of vocal and facial cues, as well as positive and negative emotional valence impact emotion detection accuracy. Overall, the results increase our understanding of emotional detection accuracy and provide support for the read out theory of emotion (Buck, 1991).

Contrary to our hypothesis, positive emotions were not always interpreted with greater accuracy than were negative. That is, nonverbal channel also influenced the accuracy of detection of positive and negative emotions in paradoxical ways. These results add partial support to current research on positive affect and emotional detection. In congruence with previous research, positive facial expressions were interpreted with far more accuracy than were negative facial expressions (Leathers & Emigh, 1980). However, when affect was displayed through vocal cues, negative emotions were decoded with more accuracy than were positive emotions. Therefore results of vocal cue detection accuracy were incongruent with past research due to the decreased accuracy for this nonverbal channel. While providing an unexpected answer to our research question, the interaction effect between nonverbal channel and affect valence on accuracy of emotion detection is the study's most interesting and only interpretable finding.

One possible explanation for the findings could be the differences in cognitive resources for visual and audio avenues of detection. Visual modalities function to facilitate affiliation and approach (Schupp, Junghöfer, Weike, & Hamm, 2003). A person is able to observe approach and affiliation through the intake of visual cues. For example, you can visually see a person moving closer to you. When in an interaction, eye contact and other facial cues that convey affiliation are observed visually. These functions are more positive in nature due to their facilitation of positive interactions and thus undoubtedly involve the display of positive emotions (Schupp et al., 2003). Because of visual systems continual exposure to such positive emotions, it could therefore stand to reason that positive emotions are detected more easily visually. As in the case of this study, this reasoning would lend to explain the higher detection accuracy averages of positive emotions for facial displays. On the other hand, auditory modalities are more integral to defense reactions (Perez, Del Carmen Fernández, Vila, & Turpin, 2000). Our ears are attuned to any sound that could signify a threat. While a danger that is far away can be seen coming from a distance, a danger cannot be heard unless it is already within earshot (Perez et al., 2000). A "danger" can easily come in the form of a negative *spoken* message. Because these auditory functions are used as a defense mechanism, it stands to reason that we are more attuned to negative auditory messages than we are positive ones. This alone could provide an explanation for the higher accuracy detection scores for vocal cues of negative emotions. Clearly, nonverbal channel influences emotion detection as it relates to emotional affect.

Another likely explanation for positive facial expressions receiving higher accuracy averages than did negative facial expressions could be found in the context of display rules. Display rules are common cultural norms depicting what emotions are acceptable to be displayed and which should be concealed (Gallios, 1993). Typically display rules solicit the display of positive emotions while inhibiting the display of negative facial emotions (Gallios, 1993). Therefore, we become less familiar with negative facial expressions lessening our ability to pinpoint them when confronted with them. Conversely, the open display of positive emotions renders us familiar with positive facial expressions. This familiarity could likely have been what led to a better detection rate among positive facial expressions.

The findings of this study find grounding in Buck's (1991) Read Out Theory. The second tenant of this theory exhibits emotions ability to be displayed externally as an emotional readout. The theory argues for the importance of nonverbal channel cues in the process of decoding emotions. While the theory contends that expression of emotion through nonverbal channels leads to more accurate detection of emotion, it had yet to be seen how accurately specific nonverbal channels were able to be decoded. This study adds to this theory by shedding light on the two specific, and important channels of nonverbal communication, vocal and facial. Results conclude that vocal cues are most accurately decoded when used to express negative emotions, while facial cues are most accurately decoded when used to express positive emotions. This theory is concerned with the process of emotional readout, and this study therefore lends to knowledge that expands how this readout is affected by both nonverbal channel and affect valence. This knowledge gives greater insight overall into the important evolutionary process of emotional communication. As emotional decoding is an important tool in facilitating social ties, and managing interpersonal interactions, it is imperative to understand how the process is enacted. Understanding how the components of nonverbal channel and affect valence influence this process gives understanding to how these variables can lead to the most accurate detections.

One possibly restrictive element in this study lies in the instrument's lack of equal amounts of emotions accounting for negative and positive affect. Positive affect was accounted for by the display of joy in both vocal and facial cues. Negative affect was represented by three emotions in the vocal cue displays (sadness, anger, and fear) and four in the facial cues section of the instrument (sadness, anger, fear and disgust). The instrument chose emotions based on Ekman's (1982) original work on the seven basic emotions that are shared universally. Because this set only includes one positive emotion, but several negative emotions, the instrument therefore contained this restriction. While this study did employ most of the expressions established by Ekman (1982), the emotion of surprise was not included in the study. Scherer and Scherer (2011) did not include this additional emotion in the Emotion Recognition Index in an attempt to achieve greater rapidity and ease of administration of the instrument. However, past research has reported decoding confusion between the emotions of surprise and fear in facial expression recognition (Ekman, 1982). Therefore this exclusion of surprise may have affected reports of accuracy for the decoding of negative emotions as displayed through facial expressions. In other words, if surprise had been decoded along with fear, participants may have fallen prey to this confusion and therefore obtained a lower accuracy score. An additional limitation of this study occurs due to the lack of demographic information collected from participants. In an attempt to ensure that the identity of participants remained anonymous, participants were asked not to record any personal information onto the Scantron. Therefore, no record of participant demographic information such as sex, age, or race was established. Therefore, inferences about decoding ability in relation to participant demographics could not be drawn. For example, past research has found support for gender differences favoring female ability to decode emotions accurately (Nowiki & Duke, 1994). The current study may have been able to add to this body of knowledge had participant sex been recorded. However, the focus of this study was not on gender differences, nor any demographic information in relation to decoding ability. Therefore, while the collection of demographic information may have added to the interpretation of this study's results, individuals were not instructed to report it. In spite of these limitations, the current research retains the ability to spur further research in this area.

The results of this study provide evidence that nonverbal channel and affect valence influence the accuracy of emotion decoding. Previously, researchers have used words and phrases, such as those from the listener's primary language to gauge vocal recognition ability. The current study used the Emotion Recognition Index, which employs vocal clips that have been coded in a fictional language constructed from phonemes selected from various European languages. Future research might extend these findings by examining the differences in the results found using the ERI and those using recognizable texts in the native language of listeners. While the results of this study found differences between the abilities of nonverbal modes of communication to produce decoding accuracy, only the modes of facial and vocal cues were analyzed. Additional research could employ other nonverbal communication channels (e.g. body language) in order to test the channel's influence on decoding accuracy as well. This could lend to a greater understanding of how nonverbal communication can influence emotional decoding accuracy overall, through several modes. Lastly, future research could further extend these findings by assessing accuracy decoding of deceitful emotional displays. The current study employs the display of explicit emotions through facial and vocal cues. Future research could measure decoding accuracy via the same nonverbal channels, with the addition of masked and falsified emotions. The addition of these emotions would lend to greater knowledge of the impact of nonverbal channel on an individual's ability to decode deceitful emotions. This future research could also employ the display of both positive and negative deceitful emotions. This would aid in the addition to the current findings of both affect valence and nonverbal channel on decoding accuracy by looking at deceitful emotions. In conclusion, the current findings of this research lay important groundwork for potential future research in this area.

This study established a significant interaction effect of nonverbal channel and affect valence on the decoding accuracy of emotions. The nonverbal channel of facial expression correlated with greater accuracy in decoding positive emotions, while vocal cues correlated with greater accuracy in decoding negative emotions. The importance of the avenue through which emotions are displayed nonverbally, as well as whether the emotions are positive or negative has a significant impact on the accuracy of emotional decoding.

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Appendix A – Study Data

Participant	(-) Facial	(+) Facial	(-) Vocal	(+) Vocal
1	76.92	100.00	70.00	83.33
2	61.54	100.00	75.00	3.33
3	65.38	100.00	85.00	50.00
4	73.08	100.00	70.00	16.67
5	57.69	100.00	80.00	0.00
6	73.08	100.00	50.00	16.67
7	53.85	100.00	90.00	16.67
8	53.85	100.00	70.00	33.33
9	73.08	100.00	75.00	66.67
10	92.31	100.00	85.00	33.33
11	65.38	100.00	70.00	50.00
12	69.23	100.00	70.00	50.00
13	65.38	100.00	60.00	50.00
14	76.92	100.00	80.00	50.00
15	53.85	100.00	55.00	50.00
16	69.23	100.00	45.00	33.33
17	46.15	100.00	70.00	50.00
18	65.38	100.00	75.00	16.67
19	61.54	100.00	70.00	0.00
20	57.69	100.00	70.00	50.00
21	53.85	100.00	50.00	0.00
22	46.15	100.00	65.00	50.00
23	76.92	100.00	80.00	33.33
24	80.77	100.00	85.00	50.00
25	76.92	100.00	75.00	33.33

26	73.08	100.00	80.00	33.33
27	53.85	100.00	80.00	66.67
28	50.00	100.00	75.00	66.67
29	65.38	100.00	80.00	50.00
30	73.08	100.00	65.00	16.67
31	65.38	100.00	70.00	33.33
32	73.08	100.00	55.00	50.00
33	69.23	75.00	75.00	33.33
34	69.23	100.00	45.00	33.33
35	65.38	100.00	90.00	33.33
36	65.38	100.00	60.00	50.00
37	57.69	100.00	75.00	83.33
38	61.54	100.00	65.00	66.67
39	76.92	100.00	80.00	33.33
40	61.54	100.00	65.00	33.33
41	73.08	100.00	70.00	16.67
42	73.08	100.00	90.00	50.00
43	03.85	0.00	15.00	0.00
44	76.92	100.00	70.00	0.00
45	76.92	100.00	80.00	33.33
46	88.46	100.00	65.00	50.00
47	57.69	100.00	55.00	50.00
48	65.38	100.00	65.00	66.67
49	53.85	100.00	75.00	16.67
50	57.69	100.00	65.00	0.00
51	50.00	100.00	75.00	66.67
52	69.23	100.00	65.00	66.67
53	65.38	100.00	60.00	66.67

54	69.23	100.00	70.00	50.00
55	57.69	100.00	60.00	33.33
56	76.92	100.00	65.00	33.33
57	76.92	100.00	70.00	16.67
58	69.23	100.00	70.00	16.67
59	65.38	100.00	75.00	50.00
60	69.23	100.00	85.00	33.33
61	69.23	100.00	80.00	33.33
62	69.23	75.00	75.00	16.67
63	73.08	100.00	0.00	16.67
64	57.69	100.00	85.00	50.00
65	73.08	100.00	70.00	66.67
66	53.85	100.00	55.00	16.67
67	61.54	100.00	90.00	16.67
68	65.38	100.00	60.00	33.33
69	65.38	100.00	75.00	66.67
70	73.08	75.00	0.00	33.33
71	73.08	100.00	80.00	33.33
72	80.77	100.00	70.00	33.33
73	61.54	100.00	80.00	50.00
74	61.54	100.00	85.00	50.00
75	46.15	100.00	75.00	66.67
76	65.38	100.00	65.00	50.00
77	61.54	75.00	60.00	50.00
78	69.23	100.00	55.00	50.00
79	53.85	100.00	20.00	6.67
80	73.08	100.00	60.00	16.67
81	65.38	100.00	55.00	33.33

82	65.38	100.00	75.00	66.67
83	46.15	100.00	35.00	33.33
84	80.77	100.00	60.00	16.67
85	61.54	100.00	85.00	50.00
86	69.23	100.00	80.00	33.33
87	69.23	100.00	85.00	0.00
88	69.23	100.00	80.00	50.00
89	7.69	25.00	55.00	16.67
90	61.54	100.00	0.00	16.67
91	73.08	100.00	60.00	50.00
92	61.54	100.00	65.00	50.00
93	61.54	100.00	85.00	66.67
94	57.69	100.00	45.00	16.67
95	38.46	75.00	70.00	16.67
96	61.54	100.00	65.00	33.33
97	57.69	100.00	70.00	33.33
98	65.38	100.00	75.00	66.67
99	73.08	100.00	65.00	16.67
100	76.92	100.00	60.00	33.33
101	42.31	75.00	70.00	16.67
102	73.08	100.00	90.00	66.67
103	61.54	100.00	70.00	33.33
104	80.77	100.00	65.00	50.00
105	50.00	100.00	50.00	33.33
106	65.38	75.00	75.00	33.33
107	57.69	100.00	70.00	16.67
108	65.38	100.00	70.00	16.67
109	57.69	100.00	70.00	33.33

110	50.00	100.00	65.00	50.00
111	65.38	100.00	80.00	16.67
112	73.08	100.00	70.00	33.33
113	53.85	100.00	65.00	0.00
114	57.69	100.00	60.00	50.00
115	65.38	100.00	70.00	50.00
116	73.08	100.00	70.00	50.00
117	73.08	100.00	60.00	33.33
118	42.31	75.00	60.00	33.33
119	73.08	75.00	55.00	50.00
120	73.08	100.00	75.00	33.33
121	76.92	100.00	60.00	33.33
122	61.54	100.00	65.00	16.67
123	73.08	100.00	70.00	16.67
124	80.77	100.00	80.00	16.67
125	69.23	75.00	70.00	16.67
126	76.92	100.00	65.00	6.67
127	69.23	100.00	80.00	83.33
128	73.08	100.00	50.00	33.33
129	65.38	100.00	75.00	50.00
130	65.38	100.00	60.00	50.00
131	69.23	100.00	65.00	33.33
132	46.15	75.00	75.00	16.67
133	73.08	100.00	85.00	33.33
134	65.38	100.00	70.00	33.33
135	65.38	100.00	65.00	16.67
136	73.08	75.00	65.00	66.67
137	73.08	100.00	60.00	16.67

138	65.38	100.00	60.00	50.00
139	65.38	100.00	80.00	33.33
140	69.23	100.00	70.00	66.67
141	53.85	100.00	70.00	50.00
142	50.00	100.00	60.00	66.67
143	80.77	100.00	90.00	16.67
144	65.38	100.00	75.00	50.00
145	73.08	100.00	60.00	50.00
146	53.85	100.00	75.00	33.33
147	76.92	100.00	65.00	16.67
148	73.08	100.00	75.00	33.33
149	69.23	100.00	70.00	33.33
150	61.54	100.00	65.00	66.67
151	65.38	100.00	80.00	50.00
152	42.31	100.00	50.00	33.33
153	65.38	100.00	75.00	50.00
154	76.92	100.00	75.00	33.33
155	73.08	75.00	70.00	50.00
156	57.69	100.00	80.00	50.00
157	73.08	100.00	75.00	0.00
158	69.23	100.00	85.00	66.67

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