ENCODING AND DECODING OF EIGHT EMOTIONS

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CHAPTER I

LITERATURE REVIEW

Introduction

Since the publication of Charles Darwin's The Expression of the Emotions in Men and Animals in 1872, scientists have attempted to explore the nonverbal communication of feelings. Darwin postulated that people can convey to others accurate information about their feeling state through the nonverbal mode, and thus set off a scientific debate that has lasted for over one hundred years. This debate began with a focus on the question of whether or not this phenomenon exists. Researchers such as Feleky (1914) and Langfield (1918) reported that feelings could be communicated nonverbally at levels beyond those expected by chance. Others, such as Landis (1924, 1929) and Sherman (1927), reported conflicting results. A good deal of the early research in this area, in fact, was marked by the findings of one author being contradicted by the findings of the next. The confusion existing during this early period was so great that two literature reviews essentially denied that feelings could be accurately communicated nonverbally. These were the reviews of Hunt (1941) and Hebb (1946).

Other major literature reviews, such as Bruner and Tagiuri (1954) and Tagiuri (1969), continued to be pessimistic about the conflicting results in this area. In his 1969 review Tagiuri, for example, listed almost as many studies reporting negative results as studies reporting positive results. Taguiri, in fact, ends his review (1969) with the admonition that psychologists study "the insights of the dramatists and poets . . ." (p. 639) as a source of new ideas. Thus, as recently as 1969, the primary question in this area of study remained unanswered.

In 1972, however, Ekman, Friesen, and Ellsworth published their exhaustive work entitled Emotions in the Human Face. This book was subtitled Guidelines for Research and an Integration of Findings, and this subtitle presents the essential nature of the book's contents. The authors carefully reanalyzed prior studies which reported negative findings, and found serious methodological errors in each of these. A number of these studies, for example, Fernberger (1927) and Guilford (1929), used artists' drawings as the stimuli to be judged for emotional expressions, discounting the fact that artists can draw facial expressions impossible for human beings to duplicate. Other studies, such as Sherman (1927), used infants as stimuli, despite the fact that infants are only capable of gross affective responses and differentiation of these into finer categories is a slow developmental process (McCandless, 1967).

Ekman, Friesen, and Ellsworth (1972) also reexamined prior studies which reported positive results, and through an integration of these with the methodological criticisms of the negative findings, the authors provide an affirmative but qualified response to the accuracy question. They report that when a reasonable number of adult live subjects are employed as the enactors, when posing is the method employed to determine the intended emotion expressed by the enactors, when a reasonable number of judges are used, and when a reasonable number of categories of emotions are sampled from the list of happiness, surprise, fear, anger, sadness, disgust-contempt, and interest, then accuracy beyond the chance level is virtually guaranteed. This is a lengthy list of methodological qualifications, but each is necessary in order to avoid the erroneous conclusions reached by some of the early investigators.

A brief digression, at this point, seems necessary in order to define some terms that will be used throughout this study. These terms have become a part of the standard vocabulary of nonverbal communication: "Encoding" or "enacting" refers to the process by which individuals nonverbally display to others information about their feeling state. "Decoding" or "judging" refers to the process by which individuals attempt to interpret or understand the nonverbal displays of others. The focus of this study is on nonverbal communication through the visual channel, with the face as the stimulus to be decoded. When research is cited which employs other channels of communication, such as tactile or auditory, this will be pointed out. "Body language" or postural type communication is beyond the scope of the present research and will not be reported.

As was noted, the initial question in this area seems to have been answered affirmatively. Other questions, however, have also been generated. One of the most important of these may be issued in the following form: "Do individuals differ in their ability to accurately encode and decode affect?" This question appears to have a rather obvious answer and, in fact, the existence of individual differences in encoding and decoding ability is taken as a "given" in modern research. In his 1964 review of the literature, Davitz reports that there are "wide differences in accuracy reported in the literature" (p. 14). He goes on to state that these differences are partially due to methodological differences, but adds that they are also due to individual differences in ability of encoders and decoders. The existence of these differences, in fact, necessitates two of the previously noted methodological qualifications (Ekman, Friesen, and Ellsworth, 1972).

A good deal of current research in this area, including the present study, is a direct consequence of the existence of these individual differences. The question at this point is: "To what factors may these individual differences be attributed?" More specifically, two of the foci of the present research are attempts to systematically relate encoding and decoding accuracy to personality factors and to sex differences. Prior to a further elaboration of these issues, however, some note should be made about the importance of this work to the field of clinical psychology.

One of the major assumptions underlying many theories of personality development and psychopathology is that accurate nonverbal communication of feelings is an important criterion for the development and maintenance of mental health. While some theorists, such as Perls (1951), openly make this assertion, others, such as Freud (1952), only imply that veridical perceptions and projections of feelings are a cornerstone of successful adaptation. Freud (1952, p. 465), for example, defined mental health as the capacity to work and love. It seems impossible to conceive of love existing between two people without accurate nonverbal communication of feelings. In a parallel fashion many psychopathological states are, in part, defined by defects in affective expression or interpretation. In _The Obsessive Personality_, Salzman (1973) speaks of obsessional needs for control and reports that "all emotional responses must be either dampened, restrained, or denied" (p. 30) by the obsessive. Kernberg (1975) deals at length with the phenomena of projective identification of hostility in borderline patients, and the interpersonal difficulties that this creates. Beck (1967) reports that sad facies are the most common feature of depressed patients, and reports that symptom relief often accompanies "the emotional release produced by crying" (p. 42). In The Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1968) corollary mood changes associated with schizophrenia are reported to include "ambivalent, constricted, and inappropriate emotional responsiveness and loss of empathy with others" (p. 33). Theorists such as Rogers (1951) seem to strongly indicate that accurate nonverbal communication is essential to both personality development and psychotherapeutic efforts.

Many therapists appear to deem accurate nonverbal communication an important component of successful psychotherapy. Rogers (1951) stresses the importance of accurate empathy, and there is little doubt that his definition of empathy includes a nonverbal component. Sullivan (1954) cautions that while the psychiatric interview is primarily vocal, it is "quite a serious error to presume that the communication is primarily verbal" (p. 7). In a similar fashion Fenichel (1945), when speaking of the method of discovering distortions, advises the therapist to ask himself, "Is the patient's facial expression in harmony with or in contradiction to what he is saying?" (p. 27).

It thus appears that accurate nonverbal communication is assumed to be of central importance to mental health and the therapeutic process by a number of theorists and therapists who maintain otherwise divergent views. One would therefore expect this assumption to be supported by the scientific literature. A search through the literature, however, lends credence to the view expressed by Tagiuri (1969). He stated that "The literature on personality correlates of the ability to judge emotions is scanty and unclear" (p. 406). It is this discrepancy between the assumptions of many, and the results of the few who have attempted to test the assumptions that provided the impetus for the present work.

Role Playing

All studies of the nonverbal communication of emotion are confronted with the task of deciding how the emotions to be communicated are to be evoked from the encoders. There are, in general, two alternatives: the evoked emotion may be either spontaneous or posed. Either alternative seems to have inherent advantages and disadvantages, and the interested reader is referred to Ekman, Friesen, and Ellsworth's (1972) comprehensive discussion of this issue. The present study will employ posing as the eliciting circumstance and a brief outline of the rationale for this will be presented.

There are at least three major problems which occur when spontaneous expressions of emotion are used. The first of these is that in naturalistic settings it is almost impossible to verify which emotion the encoder was experiencing at the time that a sample of his nonverbal behavior was recorded. If, for example, one uses newspaper photos as stimuli, the researcher is faced with the task of locating the encoder and then depending on his retrospective report to verify what he was feeling when the photo was taken. The second problem is that if a laboratory setting is used, the researcher is faced with ethical decisions if he attempts to study unpleasant feelings. Genuine anger, sorrow, or fear, for example, are all difficult to reliably elicit in a laboratory setting unless extreme measures are employed. The third problem with spontaneous expressions is that quite often such expressions are really "blends" of two or more feelings that are simultaneously experienced, i.e., the encoder may feel both angry and afraid of his anger (Ekman, Friesen, and Ellsworth, 1972). In such a case, a decoder may be accurate if he says that the encoder feels either anger or fear.

The use of role played or posed expression of emotion has obvious advantages in terms of ease of elicitation, verification of the emotion expressed, and ethical considerations. The major objection to the use of role playing was first raised by Hunt (1941) who stated that posed facial expressions were a specialized, conventionalized language which is not related to spontaneous expression. There is, however, both direct and indirect evidence that Hunt was inaccurate.

The indirect evidence stems from the work of Ekman, Sorenson, and Friesen (1969). These authors found that the same posed facial behavior was judged as showing the same emotion in a number of different cultural groups. The startling fact about these results is that pre-literate tribesmen in New Guinea, who had never been exposed to Western civilization, recognized these posed expressions with approximately the same degree of accuracy as did American subjects. It is difficult to understand how a specialized, conventionalized language could evolve so similarly across very divergent cultural groups. The direct evidence is found in the work of Zuckerman et al. (1976). These authors directly compared the spontaneous and posed expressions of 60 encoders. They found that there were large significant correlations between abilities to both encode and decode expressions elicited via spontaneous and posed modes. It thus appears that the major theoretical objection to the use of posing has, in large part, been removed. It may also be recalled that Ekman, Friesen, and Ellsworth (1972), in outlining guidelines for future research, recommended the use of posing, and this methodological technique has been adopted by a large number of researchers in this field (Fromme and Schmidt, 1972).

Encoding and Decoding of Emotion and Personality

It was previously noted that there seem to be individual differences in encoding and decoding ability. In attempting to discover which variables account for these individual differences, investigators have studied the effects of sex, level of intelligence, age, and stereotype accuracy, among others. It has generally been reported that effective nonverbal communication is correlated with stereotype accuracy, age, high intelligence level, and being female (Bruner and Tagiuri, 1954). It was also previously noted that a considerable body of clinical lore suggests that a relationship exists between various personality factors and nonverbal communication of affect. Despite this lore, Davitz (1964) in reviewing the literature could only find two studies that touch upon the relationship between personality and accurate decoding. In one of these studies Ruckmick (1921) anecdotally noted that judges' identification of emotions varied on a day-to-day basis, possibly as a result of the judges' mood changes. The other study, Levy, Orr, and Rosenzweig (1960), compared college students' and psychotics' ratings of facial expressions. There were no consistent differences found between the means of the two groups, but the psychotics tended to be more variable in their ratings.

These two studies constituted the entirety of the literature on personality correlates of decoding prior to 1964. The literature on personality correlates of encoding was nonexistent at that time. In fact, Thompson and Meltzer (1964) state that "prior studies have not been interested in the communicator (expressor) of emotion as a source of variance. . ." (p. 129). This study will be further discussed below. It should be noted at this point, however, that prior to the middle of the 1960s this entire area of research had essentially been neglected. It is one of the present author's main contentions that this neglect has been changed but little since that time, and the available research leaves many questions unanswered.

As noted above, Thompson and Meltzer (1964) conducted the first research designed to explore personality characteristics of encoders as a source of variance in nonverbal communication. These authors had 60 male and female encoders deliberately attempt to express ten emotions to four separate decoders. The encoders were seated across a table from the decoders, and were given 15 seconds in which to communicate each emotion. California Psychological Inventory scores were available for each of the encoders, but not for the decoders. The results indicated that some emotions, such as happiness, love, and fear, are easier to enact than others, such as suffering, disgust, and contempt. Low and generally positive correlations were found between the ability to enact various emotions, but Thompson and Meltzer were unable to explain the pattern of the correlations. They also noted that the encoders differed greatly in their overall ability to communicate emotion, but went on to report that these differences did not seem to be strongly correlated with any of the CPI scores. Eight correlations were reported to be significant at the .05 level, but the authors dismiss these as "about as many as would be expected by change alone" (p. 132). The authors do note one interesting qualitative observation. All four judges reported that the encoders who were the most relaxed were the easiest to judge. Thompson and Meltzer state that their results may be due to either the inadequacy of the CPI, the possibility that enactment may be correlated with traits other than those measured by the CPI, or the possibility that encoding may be unrelated to personality.

This study bears a striking resemblance to the present study. There are, however, three major methodological flaws which may also account for the results. The first of these is that the situational anxiety generated by the "live" situation, and reported by the judges, may have interacted with and obscured underlying personality differences. The second flaw is that 15 seconds is a long time to maintain a constant expression. The judges may have been confused when emotions other than the one intended were inadvertently expressed by the encoders. The third flaw is that four judges is a rather small number, and decoder variables were thus poorly controlled. The present study was designed to eliminate these methodological errors.

There have been extremely few studies of nonverbal communication that have used standard personality test scores as the dependent variables. A decoding study carried out by Davitz (1964) is an exception. Davitz' study involved communication of emotion through the vocal channel. While the present research is directed at nonverbal communication through the visual channel, there is some evidence that a correlation exists between vocal and visual abilities (Levy, 1964; Zuckerman et al., 1975), and thus Davitz' research seems to be relevant to the present study. Davitz administered a battery of personality tests to 80 subjects. The tests included: (1) the Guilford-Zimmerman Temperament Survey; (2) the Allport-Vernon-Lindzey Study of Values; (3) the Edwards

Personal Preference Schedule; and (4) the Psychaesthenia and Hysteria scales of the MMPI. He then divided the subjects into two groups of equal size. Decoding ability was measured by the subjects' responses to a tape recording developed by Davitz' co-workers. The tape was a 37-item content standard instrument which consisted of recitations of ten emotions (i.e., a speaker repeats a sentence such as "What are you doing?", while attempting to convey anger, fear, joy, etc.). Of the 33 correlations obtained from the first group of subjects, 3 were found to be significantly different from zero. Davitz reports that these results could have been obtained by chance, and this impression was strengthened by the fact that none of the correlations was cross-validated in the second group. He then concluded: "The present shotgun procedure using questionnaire techniques is clearly not a profitable line for further investigation" (p. 60).

It appears that these two studies have had a substantial impact in this field, as very little research has been conducted since that time in which broad range personality tests have been used. The majority of researchers have taken Davitz' advice to heart and have focused on variables such as introversion-extroversion, test anxiety, and field dependence as possible correlates of encoding and decoding ability. It will be remembered that Thompson and Meltzer's (1964) judges reported that those decoders who were most relaxed were easiest to judge; this observation has subsequently been further investigated.

Buck et al. (1972) used an experimental paradigm invented by R. E. Miller (1967) to study the effect of anxiety and several other variables on encoding and decoding accuracy. This technique consists of having an encoder view emotionally-laden slides while he is being surreptitiously viewed by a decoder. The decoder then attempts to categorize correctly the slide being viewed as well as rate the encoder's emotional response to the slide. Buck et al. first administered several personality scales to 24 female and 18 male subjects. The scales were: (1) the Eysenck Extroversion-Introversion Scale; (2) the Janis and Field Self Esteem Scale; (3) the Byrne Repression-Sensitization Scale; (4) the Alpert and Haber Test Anxiety Scale; and (5) the Marlowe and Crowne Social Desirability Scale. The subjects were then divided into pairs, with the encoders seated facing a screen upon which the slides were projected, while the decoders (unknown to the encoders) watched the encoders' facial expressions via closed circuit television. The 25 slides were categorized into five groups: sexual, scenic, children-mothers, disgusting-horrible, and unusual-interesting. After viewing the slide for a 10-second period, the encoders first verbally described their emotional response and then rated their reaction to the slide on a 9-point pleasant-unpleasant scale. While the encoders were making their ratings and then waiting for the next slide, the decoders attempted to correctly categorize the slide and rate the encoders' emotional response on a 9-point scale. Two accuracy measures were then obtained: percentages of slides correctly categorized by the decoders, and the correlation between the encoders and decoders' pleasantness ratings. The results were that nonverbal communication as measured by the pleasantness index was not significantly related to any of the personality measures. The categorization index, however, was positively related to several personality measures. For encoders, positive correlations were found between accuracy and extroversion ($r = .62$), accuracy and test anxiety ($r = .85$), and accuracy and debilitating test anxiety (r = .65). For decoders, a correlation was found between accuracy and self-esteem (r = .64).

These results tend to support the hypothesis that there is a relationship between personality factors and nonverbal communication, at least in terms of accurate categorization of emotion. The findings of Thompson and Meltzer (1964) are thus contradicted on both counts, i.e., a relationship seems to exist and anxiety does not seem to be a debilitating factor. Anxiety may, in fact, be related to performance in a curvilinear fashion (Spence, 1960). In addition, two results that appear to have face validity are reported. It seems logical that extroverts would be effective encoders, and that a good sense of self-esteem would enhance accurate decoding. These results, however, were obtained only with female pairs of subjects.

In a more recent study, Buck, Miller, and Caul (1974) utilized the same experimental paradigm in an attempt to replicate and expand their previous results. In this study, however, males and females were paired in all possible combinations of encoder and decoder subjects. Another change from the earlier study was the substitution of the Budner Intolerance of Ambiguity Scale for the Marlowe and Crowne Social Desirability scale. The results of this study were: (1) female encoders were more accurate communicators than males in terms of both the categorization and pleasantness-unpleasantness ratings and this was true when they were paired with both male and female decoders; (2) female decoders were not significantly more accurate than male decoders; and (3) the personality measures were not related to accurate categorization of the slides. These slides, therefore, do not support the earlier results and tend to suggest that the 1972 results were spurious.

There were, however, two other sets of results that do imply there is some relationship between personality and nonverbal communication. On the basis of a contrast between measures of physiological arousal (GSR and heart rate) and facial movement of the encoders, Buck et al. divided the encoders into two groups, which they labeled externalizers and internalizers. The externalizer subjects showed a large degree of facial movement in response to the slides, but did not exhibit large GSR and heart rate changes. The internalizers displayed the opposite response pattern, i.e., small facial changes and large physiological changes. Externalizers tended to be females and internalizers tended to be males. When the personality test scores of the externalizers and internalizers were contrasted, it was discovered that the internalizers tended to have a lower sense of self-esteem, a greater degree of introversion, and a greater degree of sensitization than the externalizers. The internalizers thus do not report an emotional experience when physiological measures show it to be present. This result seems to have important implications for mental health, especially in light of theories of the etiology of psychophysiological disorders (Wolberg, 1967).

Lanzetta and Kleck (1970) used a similar experimental paradigm to study the relationship between GSR response and accurate encoding and decoding. During the first phase of this experiment the subjects were clandestinely videotaped during a series of trials in which they were shocked after a red light was presented and not shocked following the presentation of a green light. The subjects then viewed the videotapes of themselves and others and attempted to determine whether the trial they were viewing was a shock or nonshock trial. The subjects were shocked if their response was inaccurate. The results were that affect was both encoded and decoded above the chance level ($p < .001$), but while significant differences were found between subjects in encoding ability ($p < .001$), none was found in decoding ability. It was also found that decoders were no more or less sensitive to their own nonverbal displays than to the displays of others. A strong negative correlation ($r = -.80$), however, was found between encoding and decoding ability. Thus, those who are good encoders are generally poor decoders and vice versa. The final two results tend to confirm the results of Buck and his colleagues. These results were that more errors were made in judging subjects who showed high GSR activity, but these same subjects tended to be the best judges of others. In discussing their results, Lanzetta and Kleck state their findings do not support the theory that there is a general communication factor which underlies accurate nonverbal communication, as good actors do not make good judges and good judges do not make good actors. In discussing the GSR results the authors speculate that some individuals have been punished for overt emotional displays and have therefore learned to inhibit such displays. They are, however, aroused by affect laden stimuli and experience conflict between tendencies to express and to inhibit. The high level of GSR activity is due to the combination of affective arousal and conflict. These same individuals are sensitive to affect displays in others, as these are often the cues to their own arousal and serve as warnings that suppression may be necessary.

Another of the results reported by Buck, Miller, and Caul (1974) suggested that internalizers tend to be introverts. This implies that introverts will be generally poor encoders and good decoders. Duckworth (1975) attempted to study introverts as decoders in greater detail. His study investigated whether emotionally provoking disagreements between

36 marriage partners influenced their ability to identify each other's feelings from vocal cues. The Eysenck Personality Inventory was used as a measure of introversion. The results were that among the males only the decoding ability of stable introverts increased after the disagreements, while that of neurotic introverts decreased ($p = .01$). It thus appears that the rather consistent findings that extroverts are good encoders while introverts are good decoders may need to be modified in light of the inconsistent findings concerning the effect of anxiety on performance. It seems that anxiety may foster the performance of introverts who are otherwise emotionally healthy, but prove deleterious to introverts who are emotionally troubled. A similar interaction may be posited concerning anxiety and extroversion, but this has not been experimentally explored.

Two recent studies have focused on the effect that the decoder's current emotional state has on his judgments of others. The earliest of these, Cohen and Rau (1972), compared the judgments of depressed and normal subjects. The depressed subjects were first interviewed and rated for their degree of depression. All subjects were then asked to look at a group of facial photographs and complete the following sentence for each photograph: "This face looks. . ." (p. 449). The photographs were divided into four categories: sad, thoughtful, contented, and happy. The result of this phase of the experiment was that very minimal differences were found between the groups, i.e., the depressed decoders were as accurate as the nondepressed decoders. In the next phase of the experiment the decoders were asked to "Pick out one that best looks like you feel right now" (p. 450). The results were that the depressed subjects predominantly chose photographs from the sad and thoughtful categories, while nondepressed subjects chose photographs from the contended and happy categories ($p < .001$). When the selected photographs of the depressed subjects were rated by judges on a seven-point scale from elated to depressed, and these ratings were compared to the interviewers' ratings of the subjects' degree of depression, a highly significant correlation was obtained ($p < .005$). Cohen and Rau, therefore, did not find evidence that the decoder's emotional state adversely affected his performance.

Schiffenbauer (1974), however, was able to produce evidence that affective arousal tends to influence a decoder's judgments. He divided 60 subjects into 5 groups and each group received a different emotional arousal manipulation. The manipulation consisted of listening to tapes. These were either: white noise at high volume, white noise at low volume, a comedy tape, a disgust tape, or a control tape. Each subject judged a series of facial expression slides during scheduled breaks in the tape. The results were that the subject's own emotional state exerted a strong influence on his judgment of another's emotional state. The comedy group, for example, gave the lowest percentage of negative labels, the control group the next lowest percentage, and the disgust group gave the highest percentage ($p < .05$). This was also discovered to be a linear relationship ($p < .01$). Thus, an aroused subject was more likely to attribute to the photographs the emotion he was feeling or a similarly valenced emotion than was a nonaroused or differently aroused subject. It was further found that a subject's own emotional state had an influence on the intensity of emotion he attributed to the slides. The more aroused a subject was, the more intense was the affect he attributed to the slides. This effect was independent of the affect expressed in the slide, and both of these effects held true for both positive and negative emotional states of the decoders.

In attempting to discover personality correlates of encoding and decoding abilities, researchers have also focused on traits which common sense dictates should be related to these skills. Approval seeking tendencies, for example, might well be related to accurate communication of positive affects, but not of negative affects. High approval seekers might be expected to be attuned to stimuli indicating acceptance and approval, and to have given some effort to developing their repertoire of approval inducing nonverbal behaviors. Zaidel and Mehrabian (1969) tested this hypothesis as one aspect of a rather complex study. In the first part of their experiment, Zaidel and Mehrabian administered the Crowne and Marlowe Social Desirability Scale to a large pool of subjects, and then selected the three highest and lowest scoring males and females to participate in an encoding and decoding task. The task combined both verbal and visual channels of communication, and involved five degrees of positive and negative attitudes, i.e., strong positive, moderately positive, neutral, moderately negative, and strong negative. In the second part of the experiment, 36 male and 36 female subjects were first divided into high approval seeking and low approval seeking groups. These subjects then decoded the recorded vocal and visual nonverbal communications of the subjects from the first part of the experiment. The results were that for both the visual and vocal channels, low social approval seekers were more accurate encoders than were high social approval seekers. The major reason for this, however, was the superiority of the low social approval seekers in communicating negative attitudes. The high social approval seekers were slightly better at encoding positive attitudes, but this difference was outweighed by their difficulties in communicating negative affect. In contrast to the encoding differences, there were no differences found between the groups in decoding ability.

In a somewhat similar vein as Zaidel and Mehrabian, Snyder (1974) developed a Self-Monitoring Scale, and attempted to apply this idea to the problem of accurate encoding and decoding. He reports that self-monitors are not necessarily high approval seekers, as those who score high on the need for approval tend to be somewhat schizoid. He states that those who are high on self-monitoring are people who: (1) are concerned about their own social appropriateness, (2) are sensitive to the expressions and self-presentations of others as cues to the social appropriateness of self-expressions, and (3) use these cues for monitoring and managing their own self-presentations. Snyder then developed a scale designed to assess self-monitoring (SM). This scale is not significantly correlated with the Marlowe and Crowne Social Desirability Scale, the MMPI Pd Scale, the Alpert and Haber Test Anxiety Scale, or with measures of inner and other directedness. When Snyder divided encoders and decoders into high and low groups based on self-monitoring (SM) test scores, he found that his test correlated positively with both encoding and decoding ability. When high SM encoders were paired with high SM decoders, the most accurate communication occurred. The next most accurate pairing occurred with high SM encoders and low SM decoders. The two least accurate pairings, respectively, were low SM encoders with high SM decoders, and finally low SM encoders with low SM decoders.

Another approach that has recently received some attention in the literature is an attempt to correlate field dependence with encoding and decoding accuracy. Wolitzky (1973) reports that it has been suggested that field dependent subjects have superior performance to field independent subjects in only one area: attunement to and memory for socially relevant stimuli. It has therefore been postulated that field dependent subjects may be highly accurate decoders. Wolitzky, however, states that interest does not guarantee perceptiveness, and he tested the hypothesis that field independent subjects are more accurate decoders than field dependent subjects. Wolitzky's stimuli to be judged by the decoders was the decoders was the Feldstein Affect Judgment Test. This is a vocal test of nonverbal communication in which a neutral passage is repeatedly read in tones of anger, depression, fear, hate, joy, nervousness, sadness, and neutral. The task of the decoder was to correctly identify the affect being expressed. The result of this experiment was that field independent subjects were significantly more accurate decoders than field dependent subjects ($p < .001$). Thus, Wolitzky's comment that interest does not guarantee perceptiveness has received support.

Additional support for the communicative superiority of field independent subjects comes from the work of Shennum (1976). He compared field dependent and independent subjects as encoders. Using the familiar Miller experimental paradigm (Miller, 1967), Shennum had 20 field dependent and 20 field independent female subjects view 6 pleasant and 6 unpleasant slides while their facial expressions were being videotaped by a concealed camera. These tapes were later viewed by judges who attempted to correctly categorize the slides being viewed. When Shennum divided the encoders into high and low expressive groups, he found that the nonexpressive encoders were significantly more field dependent than the expressive encoders. Thus, Shennum's results parallel Wolitzky's, and

Shennum concludes that field dependent subjects were possibly raised in families in which strong adherence to social authority was practiced in conjunction with parental admonitions against emotional expressiveness. As adults, therefore, these subjects are both field dependent and nonexpressive.

The foregoing studies essentially constitute the entirety of published experimental research to date on personality correlates of encoding and decoding. It is quite evident from this review that there does not seem to be any clear trend emerging from the literature. The findings of one author seem contradicted by the next, and so little work has been done that it seems quite premature to state that personality factors are not related to communicative ability. It is the present author's opinion that the dearth of consistent findings in the literature are more representative of the lack of well-controlled research and general paucity of work that has been done, than the possibility that accurate nonverbal communication is unrelated to personality factors. It seems that the well-constructed research guidelines laid down by Ekman and his colleagues (Ekman, Friesen, and Ellsworth, 1972) have essentially been ignored, and that the previously noted pessimism of the Thompson and Meltzer (1964) and Davitz (1964) studies has been given too much credence.

The Circular Theory of the Emotions

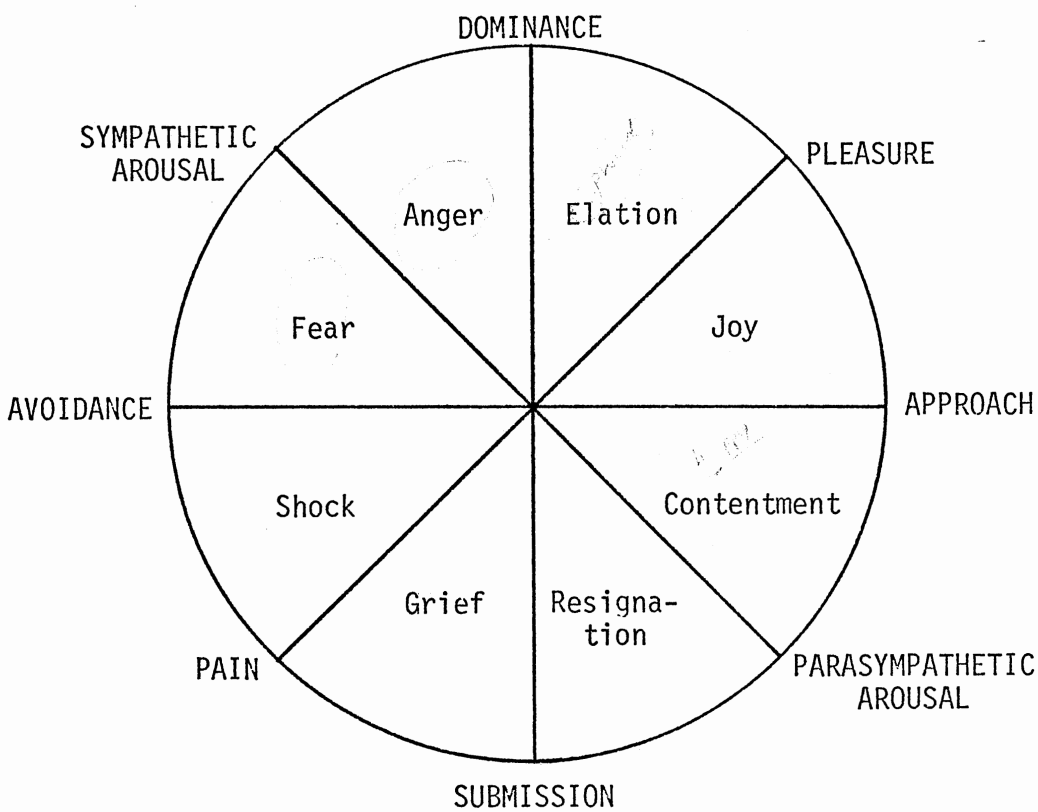
In a previous section of this study it was noted that all researchers who attempt to study nonverbal communication of emotion are faced with the task of deciding how the emotions to be studied are to be evoked from the encoders. In a similar fashion researchers must decide which categories or dimensions of emotion are to be sampled. As a rule, researchers tend to study either emotional dimensions (sleep-tension, attention-rejection, pleasant-unpleasant, etc.) or emotional categories (anger, fear, sorrow, joy, etc.). A brief review of studies already noted will expose how pervasive this dichotomy is in the current literature. Thompson and Meltzer's (1964) study is an excellent example of a categorical approach, as is Davitz' (1964), while the studies of Shennum (1976) and Buck et al. (1972) are essentially dimensional studies. Unfortunately, few researchers have explained in detail the theoretical basis underlying their choice of a dimensional or categorical approach, and fewer still have elaborated upon their rationale for the number and type of dimensions or categories chosen. This, in the present author's opinion, has greatly increased the degree of confusion existing in this field.

Ekman, Friesen, and Ellsworth (1972) provide an excellent summary of the rationale behind the use of either a categorical or a dimensional approach, as well as a discussion of the relative advantages and disadvantages of each. There is some reason, however, to believe that these two approaches can be fruitfully combined in a model which integrates them in a fashion consistent with prior research and theory.

Dittman (1972), in his book Interpersonal Messages of Emotion, reviewed the literature on dimensional studies and found that three dimensions are most commonly encountered, while a fourth dimension emerges with somewhat less frequency. These bipolar dimensions suggest the possibility of eight clear-cut emotional categories. In addition, a number of category type theorists suggest the existence of eight emotional categories. These are the categories of Plutchik (1962), Allport (1924), and Izard (1971). In addition, Ekman, Friesen, and Ellsworth (1972) reviewed all prior categorical studies and report that seven categories have been independently found by investigators. They adamantly state that this list is not exhaustive, but a minimum. Therefore, there seems to be excellent rationale for a model of emotions which includes eight categories, arranged along four dimensions.

Such a model was proposed by Fromme (1977). This model closely resembles those proposed by Schlosberg (1954) and Plutchik (1962), and consists of a circular order of eight emotions arranged along four dimensions (Figure 1). Inspection of Figure 1 will reveal that two of the dimensions (Dominance-Submission and Avoidance-Approach) are behavioral in nature, while the other two dimensions are physiological. This reflects the author's assumption that emotions consist of varying degrees of arousal and hedonic tone (the physiological dimensions), and also serve to guide and direct the individual's behavior in an evolutionarily adaptive fashion (Fromme, 1977).

A recent study, O'Brien (1976), served as a preliminary test of this model. O'Brien found that when encoders were given instructions to enact an emotion in dimensional terms, decoders could accurately categorize that emotion. For example, encoders were told to display an emotion characterized by being mildly aroused, sure that they could dominate the situation, that this dominance was associated with strong pleasure, and that the situation was somewhat attractive. These are the dimensions appropriate to elation. Decoders were then asked to choose which category this affect display seemed to represent. The decoders were, of course, without knowledge of the dimensional instructions. The results indicated that decoders could correctly categorize beyond levels expected by chance. It was also found that these errors made by the decoders



Source: Fromme, 1977.

Figure 1. The Circular Structure of the Emotions

tended to be the choice of an emotional category adjacent to the intended category. Thus, support was obtained for both the integration of the dimensional and categorical approaches, and the particular circular ordering of the emotions presented by this model.

The present research is, in part, based on this model, and constitutes a further test of the model. The emotional categories chosen for the present research are the eight emotions postulated by Fromme (1977). One of the hypotheses under investigation concerns the circular ordering of the emotions and their assumed similarity.

Sex Differences in Nonverbal Communication

Sex differences are one of the variables extensively explored in the study of nonverbal communication. Bruner and Tagiuri in their 1954 literature review note that females have generally been found to be more effective expressors of emotion than men, but add that this is still open to debate. In his 1969 review, Tagiuri again notes the existence of this finding. Superior decoding skills, however, have not been found to exist in women with nearly the same degree of consistency. In fact, some studies have reported that males are somewhat more accurate decoders than females. Other reviewers, such as Davitz (1964), have taken an almost opposite position and have asserted that there are no encoding or decoding sex differences. Perhaps the position assumed by Zaidel and Mehrabian (1969) is the most appropriate. These authors assert that "the issue remains open to further evidence" (p. 234).

A number of studies previously reviewed have, in part, been concerned with the effect of sex differences on nonverbal acuity. Most noteworthy among these are the studies of Buck and his colleagues (1972, 1974). In both of these studies, the results were essentially in line with the general trends noted by Tagiuri. In the 1972 experiment it was found that female pairs of subjects communicated more accurately than male pairs. The 1974 study was essentially a more complex replication of the 1972 study, and once again female encoders were found to be superior to males. This was true even when female encoders were paired with male decoders. An additional finding, however, was that female decoders were not superior to male decoders. The authors speculate that these differences may be attributable to the fact that young males are frequently taught to inhibit overt emotional responsiveness.

This speculation has received some support from two other studies initiated by Buck (Buck, 1975; and Buck, Worthington, and Schiffman, 1973). In both of these studies the familiar Miller experimental paradigm (1967) was employed in an attempt to extend the previous findings. In these studies, however, children served as the encoders, and in both studies female children were found to be superior to males in encoding ability. Sex differences, however, were not as pronounced in children as in adults. This lends support to Buck's speculation as to the genesis of these differences.

Three other previously reviewed studies have also been concerned with sex differences. In two of these the general trend for females to be superior was noted, while the third study reversed this trend. In the first of these (Zaidel and Mehrabian, 1969) it was found that females were considerably superior to males in communicating variations in negative attitude, while males were somewhat better than females in communicating positive feelings. The overall communicative superiority of females, in this study, was largely due to their ability to communicate negative feelings. The second study again employed the Miller paradigm (Miller, 1967), and in this experiment (Zuckerman et al., 1976) females were found to be better decoders than males. The third previously reviewed study (Thompson and Meltzer, 1964) reversed the general trend. These authors found that males were superior to females in enacting ability. These authors take pains, however, to note that this male superiority is only of a minor degree, and is almost entirely due to males being more accurate encoders of happiness and disgust.

It was noted above that Zuckerman and his colleagues (1976) found females to be better decoders than males. In an earlier study (Zuckerman et al., 1975) the authors compared the encoding and decoding abilities of males and females in both the auditory and visual channels. In this study the Miller paradigm was not employed and the subjects were instructed to pose six categories or emotions while still photographs were taken. The auditory methodology followed that used by Davitz (1964). All possible male-female combinations of encoders and decoders were used. It was found that females were slightly better encoders and significantly better decoders than males in both the auditory and visual modes. In addition, the authors discovered that same sex pairs received higher decoding scores in the auditory condition while opposite sex pairs decode better in the visual condition.

In addition to the above, a number of other studies concerning sex differences deserve note. The earliest of these, Drag and Shaw (1967), was essentially a replication of the Thompson and Meltzer (1964) experiment. Drag and Shaw agreed with Thompson and Meltzer in the finding that happiness was the easiest and contempt was the most difficult to communicate. Their findings regarding sex differences, however, were in marked contrast. Drag and Shaw report that females were superior to males in encoding ability. Further, these authors found that females encoded both positive and negative affects more effectively than males. This latter finding, in part, contradicts Zaidel and Mehrabian (1969) who found males to be better communicators of positive feelings. Finally, in a more recent study, Sweeny and Cottle (1976) asked 100 male and female graduate students to identify nonverbal information about emotional states from photographs. These authors found females to be more accurate decoders than males, regardless of the field of graduate study of these students.

Thus, while there still seems to be room for new input, answers to questions concerning sex differences in nonverbal acuity seem to be clearer than answers to questions concerning the effect of personality factors. The general trend that seems to be emerging at this point in time is that females are superior to males in communicative ability. This superiority seems to be best documented for females as encoders and is somewhat less clear for females as decoders.

Hypotheses

Four hypotheses will be investigated in this study. The first of these is that there is a positive linear relationship between encoding accuracy and decoding accuracy (when both are considered together) and mental health as measured by scores on the Eysenck Personality Inventory neuroticism scale.

The second hypothesis is that decoding ability is a general trait while encoding ability is a series of specific traits. It is predicted that the intercorrelations among all the decoding accuracy scores will be significant and of a greater magnitude than the intercorrelations among the encoding accuracy scores, and that the encoding accuracy intercorrelations will show a greater tendency to be nonsignificant.

The third hypothesis is a test of the circular model of the emotions presented by Fromme (1977). It is hypothesized that encoding and decoding errors will most likely consist of identification of the intended emotion expressed as an emotion in either of the adjacent categories, the next most frequent errors will be two steps removed, the next most frequent errors three steps removed, and the least frequent errors will consist of a choice of the opposite emotion. Figure 1 presents the circular model.

This hypothesis thus has eight components, one of which will be presented for illustrative purposes. If the emotion expressed by the encoder is grief, it is hypothesized that this emotion will be most frequently misidentified as either shock or resignation, the next most frequently occurring misidentification will be fear or contentment, the next most frequently occurring will be anger or joy, and the least frequently occurring will be elation.

The fourth and final hypothesis under investigation is that men will be more accurate decoders of emotion than women while women will be more accurate encoders than men. This result is expected for both same sex and opposite sex pairs of encoders and decoders.

CHAPTER II

METHOD

Subjects

The subjects for this study were 36 male and 36 female, Caucasian, undergraduate students enrolled during a summer semester at Oklahoma State University. The age range was from 18 to 35 years. The mean age for males was 22.4 years, and the mean age for females was 24.2 years.

Materials

All subjects were administered the Eysenck Personality Inventory (EPI). For more information concerning the EPI see Appendix A.

Encoding photographs of the subjects were taken with a tripod mounted 35mm Nikon F camera. During the decoding phase of the experiment, the subjects viewed 96 35mm slides. These slides were obtained by having 12 professional actors (6 males and 6 females) attempt to enact the eight emotions of Fromme's circular theory (1977). These actors were not the subjects for this experiment, but had served as subjects in a previous study (Neal, 1978). During the decoding phase of the experiment, the subjects were provided with checklists on which to indicate their judgment of the emotion expressed in each slide. The order of the list of emotions at the top of the checklist was randomized for each subject.

Procedure

There were three separate phases in this experiment. They were: (1) administration of the Eysenck Personality Inventory, (2) encoding the eight emotions, and (3) decoding the 96 slides. During the experiment the subjects participated in the phases in the order described.

The subjects were met in groups of four or less by the experimenter. They were first escorted into the testing room where the Eysenck Personality Inventory was administered. The instructions that were read to the subjects were as follows:

> My name is Tom Dohne. As part of my research, I would like for you to complete the questionnaire which is on the desk before you. I will read the directions out loud. Please follow along with me.

The directions for the EPI were then read to the subjects. When the directions had been read, the experimenter continued:

> You may take as much time as you like to finish the questionnaire. When you have finished, please turn it in to me.

The second phase of the experiment was the encoding phase. The subjects were individually escorted into a room containing a desk, on top of which was the camera, and a piece of masking tape was placed on the floor ten feet in front of the camera. This distance allowed the subject's entire face to appear on the film. Color film was employed. The speed of the film was such that natural lighting conditions were used.

The subject was asked to stand facing the camera with his toes placed on the masking tape. The following instructions were then read to the subject:

> For the second part of my research, I would like to take some pictures of you while you are imagining that you are experiencing eight different emotional states. I will first tell you what the emotion is, then describe a short scene appropriate to that emotion. I will then ask you to practice

imagining yourself in the situation, experiencing the emotion, and expressing it without using words. When you feel ready to go ahead, I will turn around, count to four, and then take your picture.

The eight scenes were then presented to the subject one at a time, in a random order. The scenes and their corresponding emotions were:

1. Elation--Imagine that you are about to win a prize for which you have been competing with all your heart, and you feel very elated.

2. Joy--Imagine that you are just greeting a very close friend that you have not seen in years, and you feel very joyous.

3. Contentment--Imagine that you have just finished a very satisfying day, and you feel very warm and very contented.

4. Resignation--Imagine that you have just been given a traffic summons which will require you to appear in court and pay a heavy fine, and you are resigned to it.

5. Grief--Imagine that you have just been told that a close family member has died and you feel much grief.

6. Shock--Imagine that you have just opened your utility bill for the month. It shows that you owe $530.26. You cannot afford to pay this, you do not know what to do, and you are shocked.

7. Fear--Imagine that you are crossing the street and see a car coming at you at a high rate of speed. You are very afraid, and are preparing to leap aside.

8. Anger--Imagine that someone has just been rude and insulting to you, and you are extremely angry.

After each photograph was taken, the experimenter asked each subject if he had been ready when the picture was taken. If the subject replied that he had not been, the scene was repeated and another photograph was taken. This procedure closely follows that suggested by Ekman, Friesen, and Ellsworth (1972), and the role playing instructions have been used in several prior studies (Dohne, 1978; Fromme and Schmidt, 1972; and Neal, dissertation in progress).

The subjects were then escorted into another room to complete the decoding phase. The room contained desks, chairs, and a 35mm slide projector which was placed 15 feet away from a movie screen. The following instructions were read to the subjects:

> As the third part of my research, I would like you to view some slides of people who are expressing various emotions. On the desk before you are some sheets of paper with rows numbered from 1 to 96, and columns labeled fear, anger, elation, joy, contentment, resignation, grief, and shock. When I show a slide I will call out its number. Please place a checkmark in the column which you feel best describes the emotion being expressed by the person in the slide. The slides will be exposed for five seconds each, and then there will be a five-second period of illumination.

The subjects were then shown the slides which had been placed in a random order. As soon as a slide appeared on the screen, the experimenter called out its number. Following the five-second slide exposure, a five-second period of illumination was provided, during which the subjects marked their responses. This was accomplished by alternating a slide with a blank space in the carousel. This procedure was used in a prior study (Dohne, 1978) and closely follows that used by Ekman and Friesen (1967).

At the conclusion of the decoding phase, the subjects were thanked for their participation, and the nature of the research was explained to them.

When the photographs that had been taken during the encoding phase were developed, encoding accuracy scores were obtained. This was accomplished by having 12 separate judges (6 male and 6 female) attempt to decode the subject's encoding attempts. These judges were graduate students at Oklahoma State University who were unacquainted with the subjects. The procedure for the judging session was the same as the decoding procedure described above.

Description of Variables

A total of 19 different decoding and encoding accuracy scores were tabulated. These were: decoding accuracy scores for each of the eight emotions, encoding accuracy scores for each of these same emotions, an overall or total decoding accuracy score, a similar total encoding accuracy score, and a grand total encoding plus decoding accuracy score. The decoding accuracy score for each subject in each of the emotion conditions was the number of professional actors whose emotional expression the subject correctly identified. The encoding accuracy score for each subject in each of the emotion conditions was the number of graduate student judges who correctly identified that subject's attempt to encode the emotion. Each of the total accuracy scores was obtained by the use of a simple summation procedure.

It should be noted that all emotions were both encoded and decoded at levels far beyond those predicted by chance. As there were eight emotions to be encoded and decoded, and twelve professional actors and graduate student judges, chance would predict mean encoding and decoding accuracy scores of 1.50. Inspection of Table VIII (page 46) will reveal that mean accuracies ranged from 3.78 to 8.63.

There were four additional variables employed in this study. These were: the sex of the subejct as well as the sex of the professional actors and graduate student judges, Extraversion scale scores, Neuroticism scale scores, and Lie scale scores. In all analyses involving the Eysenck Personality Inventory, raw scores were used. In all analyses sex was scored zero (0) for females and one (1) for males.

Preliminary Analysis

The data were first analyzed by computing Pearson Product Moment Correlations. All variables were correlated with all others, and the list of variables consisted of: the eight encoding and eight decoding accuracy scores, the total encoding accuracy score, the total decoding accuracy score, the total encoding plus decoding accuracy score, the Extraversion scale score, the Neuroticism scale score, the Lie scale score, and the sex of the subject. Thus a 23 X 23 correlation matrix was obtained. In addition, Neuroticism scale scores were correlated with each of the encoding and decoding accuracy scores for males and for females separately.

First Hypothesis

The first hypothesis was tested by means of three regression analyses: one for males, one for females, and one for males and females combined. Total encoding and total decoding accuracy scores were used in an attempt to predict Neuroticism scale scores.

Second Hypothesis

The second hypothesis, that decoding ability is a general trait while encoding consists of a series of specific abilities, was tested by means of two factor analyses. One of these was devoted to encoding while the other was devoted to decoding.

Third Hypothesis

The third hypothesis concerned the circular ordering of the emotions postulated by Fromme (1977). The hypothesis predicted an orderly pattern of errors, and was tested by calculating encoding and decoding accuracy and error means for each of the eight emotion conditions. General trends in these accuracy and error rates were further examined by calculating mean encoding, mean decoding, and mean encoding plus decoding accuracy and error rates.

Fourth Hypothesis

The final hypothesis under investigation is that men are more accurate decoders of emotion while women are more accurate encoders. This result was expected for both same sex and opposite sex pairs of encoders and decoders. This hypothesis was first tested by means of a three way analysis of variance. The analysis was a 2 X 2 X 2 design: sex of subject X encoding/decoding accuracy X same sex or opposite sex pairs of communicators. Following this analysis, the sex of subject X encoding/decoding accuracy interaction was further clarified by performing t tests, but these were only performed in the event that the interaction was significant at p levels $\leq .05$. In all cases the nature of the three way interaction was further explored by performing t tests.

CHAPTER III

RESULTS

Correlation Results

The first analysis consisted of the computation of Pearson Product Moment Correlations and their associated levels of probability for all of the variables in this study. Table XVIII (Appendix B) contains the 23 X 23 correlation matrix that was generated.

Table I contains those variables that were found to be correlated with probabilities $\leq .05$. A total of 25 pairs of variables were found to be significant at these levels. As these correlation results were used to determine variables to be either included or excluded from some of the further analyses as well as decisions concerning the form of those analyses, three points in reference to Table I should be made.

The first of these is that Neuroticism correlates negatively with sex. Females, in this sample, scored higher on the Neuroticism scale than did men. Table II contains the correlations between Neuroticism and encoding and decoding accuracy for each emotion for males and for females. The second point is that there is very little correlation between any of the individual decoding accuracy scores and the individual encoding accuracy scores. The third point is that sex correlates negatively with several of the accuracy scores, including all three total accuracy scores; females tended to be more accurate communicators than males.

TABLE I

VARIABLES CORRELATED WITH p VALUES ≤ .05

Variables	r	Probability
Sex X Neuroticism	-.26	.03
Sex X Dec. Elation	-.27	.02
Sex X Dec. Contentment	-.26	.03
Sex X Dec. Grief	-.29	.01
Sex X Total Decoding	-.33	<.01
Sex X Enc. Elation	-.23	.05
Sex X Enc. Shock	-.25	.04
Sex X Total Encoding	-.31	<.01
Sex X Total Enc. and Dec.	-.41	<.01
Total Dec. X Enc. Anger	.25	.04
Total Enc. X Dec. Fear	.24	.04
Dec. Elat. X Dec. Joy	.31	.01
Dec. Elat. X Dec. Resig.	.27	.02
Dec. Elat. X Enc. Grief	-.24	.04
Dec. Cont. X Enc. Grief	-.24	.04
Dec. Cont. X Enc. Shock	.24	.04
Dec. Grief X Neuroticism	.23	.05
Dec. Grief X Dec. Anger	.28	.02
Dec. Fear X Enc. Anger	.36	<.01
Enc. Elat. X Enc. Shock	.34	<.01
Enc. Elat. X Enc. Fear	.29	.01
Enc. Joy X Enc. Fear	-.27	.02
Enc. Shock X Enc. Fear	.42	<.01
Enc. Shock X Enc. Anger	.33	<.01
Enc. Anger X Extraversion	.24	.04

TABLE II

CORRELATION OF NEUROTICISM TEST SCORES WITH ENCODING AND DECODING ACCURACY SCORES FOR MALES AND FEMALES

Dependent Variable	Neuroticism (Males)	Neuroticism (Females)
Decoding Elation	r = -.06 p = .72	r = -.02 p = .92
Decoding Joy	r = -.06 p = .71	r = -.08 p = .66
Decoding Contentment	r = -.05 p = .77	r = -.02 p = .92
Decoding Resignation	r = -.20 p = .27	r = -.17 p = .32
Decoding Grief	r = .02 p = .90	r = .33 p = .05
Decoding Shock	r = -.14 p = .43	r = .32 p = .06
Decoding Fear	r = .01 p = .94	r = -.10 p = .56
Decoding Anger	r = -.19 p = .27	r = .18 p = .30
Total Decoding	r = -.19 p = .27	r = .09 p = .59
Encoding Elation	r = -.07 p = .68	r = -.27 p = .12
Encoding Joy	r = -.15 p = .37	r = .24 p = .16
Encoding Contentment	r = -.18 p = .29	r = .17 p = .31
Encoding Resignation	r = -.18 p = .30	r = -.03 p = .85
Encoding Grief	r = .05 p = .76	r = -.10 p = .54
Encoding Shock	r = .01 p = .94	r = -.17 p = .31
Encoding Fear	r = .04 p = .81	r = -.37 p = .03
Encoding Anger	r = -.16 p = .36	r = .00 p = .98
Total Encoding	r = -.18 p = .30	r = -.26 p = .13
Total Enc. and Dec.	r = -.23 p = .18	r = -.18 p = .29

Regression Analyses

The data were next analyzed by means of a multiple regression procedure in which total encoding accuracy scores and total decoding accuracy scores, both alone and in combination, were used in an attempt to predict Neuroticism scale scores. As a result of the significant correlation between Neuroticism and sex, three separate analyses were performed; one for males, one for females, and one for males and females combined.

Calculated values of $\underline{F}$ and their associated $\underline{p}$ values for these three analyses are presented in Tables III, IV, and V. It will be noted in all three tables that the regression procedure failed to predict Neuroticism scale scores at levels of probability $\leq .05$. It thus appears that total encoding and total decoding accuracy is not related to Neuroticism in a linear fashion as hypothesized.

Factor Analysis

Two separate factor analyses were performed, one for encoding and one for decoding. The Principal Axis factor method and a Varimax rotation were employed. For both the encoding analysis and the decoding analysis, only those factors with eigenvalues exceeding 1.0 were retained. In both analyses this procedure yielded a total of four factors. These four factors accounted for a cumulative proportion of .64 for decoding and .68 for encoding.

Table VI presents summary data for decoding. For purposes of clarity, factor loadings are reported only for those variables which are included in the factor. Variables were included in a factor only if their

TABLE III

LINEAR REGRESSION ANALYSIS SUMMARY TABLE FOR MALES

Source	d.f.	F-Ratio	Probability
Decoding Accuracy	1,33	1.25	.27
Decoding Accuracy in Addition to Encoding Accuracy	1,33	.80	.38
Encoding Accuracy in Addition to Decoding Accuracy	1,33	.66	.42
Encoding Accuracy	1,33	1.12	.30

TABLE IV

LINEAR REGRESSION ANALYSIS SUMMARY TABLE FOR FEMALES

Source	d.f.	F-Ratio	Probability
Decoding Accuracy	1,33	.30	.59
Decoding Accuracy in Addition to Encoding Accuracy	1,33	.14	.71
Encoding Accuracy in Addition to Decoding Accuracy	1,33	2.17	.15
Encoding Accuracy	1,33	2.34	.14

TABLE V

LINEAR REGRESSION ANALYSIS SUMMARY TABLE
FOR MALES AND FEMALES COMBINED

Source	d.f.	F-Ratio	Probability
Decoding Accuracy	1,71	.05	.82
Decoding Accuracy in Addition to Encoding Accuracy	1,71	.18	.68
Encoding Accuracy in Addition to Decoding Accuracy	1,71	.95	.33
Encoding Accuracy	1,71	.82	.37

loading exceeded $\pm.35$. Table XVIII (Appendix B) presents a complete listing of factor loadings for all decoding emotion conditions.

Table VII presents similar summary data for encoding. The inclusion rule was the same as for decoding. Table XIX (Appendix B) presents a complete listing of factor loadings for encoding.

Inspection of Tables VI and VII reveals that the hypothesis that decoding is a general trait, while encoding is a series of specific abilities, received only minimal support from these analyses. A large common "decoding of positive emotions" factor was found, and is listed as Factor I in Table VI. Several other common decoding factors were found as was one single emotion factor. In addition, the table of encoding factors, Table VII, reveals several common two and three emotion factors, and no single emotion factors.

Accuracy and Error Distributions

The data were further analyzed, at this point, by the calculation of accuracy and error means for each of the eight encoding and decoding conditions. This was accomplished for decoding by first summing the number of correct responses to an emotional category, then summing the number of errors by category, and then dividing these sums by the number of subjects (72). For encoding, a correct response was scored whenever one of the graduate student judges correctly identified the emotion that a subject had attempted to portray, while an incorrect response was scored when the judge chose an emotion other than the one the subject had intended. Following this scoring, accuracy and error means were calculated on the same basis as described for decoding. Because there were

TABLE VI

VARIMAX ROTATED FACTOR LOADINGS FOR DECODING

Emotion	Factor I	Factor II	Factor III	Factor IV
Elation	.53	---	-.59	---
Joy	.73	---	---	---
Contentment	.57	---	---	---
Resignation	.64	---	---	---
Grief	---	.83	---	---
Shock	---	---	.90	---
Fear	---	---	---	.93
Anger	---	.75	---	---
Proportions	.19	.17	.15	.13

TABLE VII

VARIMAX ROTATED FACTOR LOADINGS FOR ENCODING

Emotion	Factor I	Factor II	Factor III	Factor IV
Elation	.70	---	---	---
Joy	---	.77	---	---
Contentment	---	.63	---	---
Resignation	---	.56	---	.58
Grief	---	---	---	.81
Shock	.67	---	.55	---
Fear	.79	---	---	---
Anger	---	---	.54	---
Proportions	.22	.17	.15	.14

12 professional actors for the subjects to decode, and 12 graduate student judges, the possible range of accuracy and error means was from 0 to 12, for both encoding and decoding.

The obtained means are presented in Table VIII. Figure 2 is provided to aid in the interpretation of Table VIII. The table is arranged so that correct encoding and decoding means for each of the emotion conditions are presented under the column labeled 0. The columns labeled +1, +2, and +3 represent errors either 1, 2, or 3 steps removed in a clockwise direction (according to Figure 2) from the correct emotion. In a similar fashion, the columns labeled -1, -2, and -3 represent errors either 1, 2, or 3 steps removed in a counterclockwise direction. The column labeled ±4 represents errors in which the emotion diagonally opposite from the one intended was chosen. For example, when elation is the emotion in question, then column +1 represents joy while column -1 represents anger, column +2 represents contentment while column -2 represents fear, and so on.

It may be observed from Table VIII that in each emotion condition, for both encoding and decoding, the largest mean occurs in column 0, representing correct encoding or decoding. The pattern of error means, however, is quite dissimilar from the pattern predicted. In several cases, in fact, the largest mean error rate occurs in the ±4 column, the column predicted to contain the fewest errors. Thus, while some support for Fromme's (1977) predictions was obtained, the results did not generally support the hypothesis that decreasing error frequencies would occur symmetrically.

TABLE VIII

ACCURACY AND ERROR MEANS FOR DECODING AND ENCODING

Emotion	-3	-2	-1	0	+1	+2	+3	±4
Dec. Elat.	.14	.03	.01	6.73	4.43	.49	.10	.01
Enc. Elat.	.31	.25	.19	4.94	4.39	1.39	.42	.14
Dec. Joy	.01	---	2.78	7.90	1.13	.11	.05	---
Enc. Joy	.28	.24	3.18	5.06	1.25	.52	.18	.47
Dec. Cont.	.07	.68	2.26	7.48	1.11	.29	.08	.02
Enc. Cont.	.97	.30	1.75	5.29	2.33	.86	.25	.25
Dec. Resig.	.16	.18	3.15	5.16	2.48	.07	.03	.68
Enc. Resig.	.08	.36	1.56	5.10	1.67	.61	.54	2.12
Dec. Grief	.19	.40	2.43	6.07	.58	.29	1.81	.22
Enc. Grief	.08	.45	2.32	6.90	.35	.30	1.68	---
Dec. Shock	.03	.32	.22	7.04	3.97	.22	.12	.02
Enc. Shock	.85	1.56	2.13	3.78	2.58	.58	.10	.56
Dec. Fear	.63	1.04	4.11	5.02	.78	.23	.09	.06
Enc. Fear	.87	1.14	3.75	4.15	.70	.28	.33	.80
Dec. Anger	.98	.33	.26	8.63	.10	.07	.26	1.35
Enc. Anger	1.57	.23	.54	6.81	.05	.19	.60	1.95
Mean Dec.	.28	.37	1.90	6.75	1.82	.22	.32	.30
Mean Enc.	.63	.57	1.93	5.25	1.65	.59	.51	.78
Grand Mean	.45	.47	1.91	6.00	1.74	.41	.42	.54

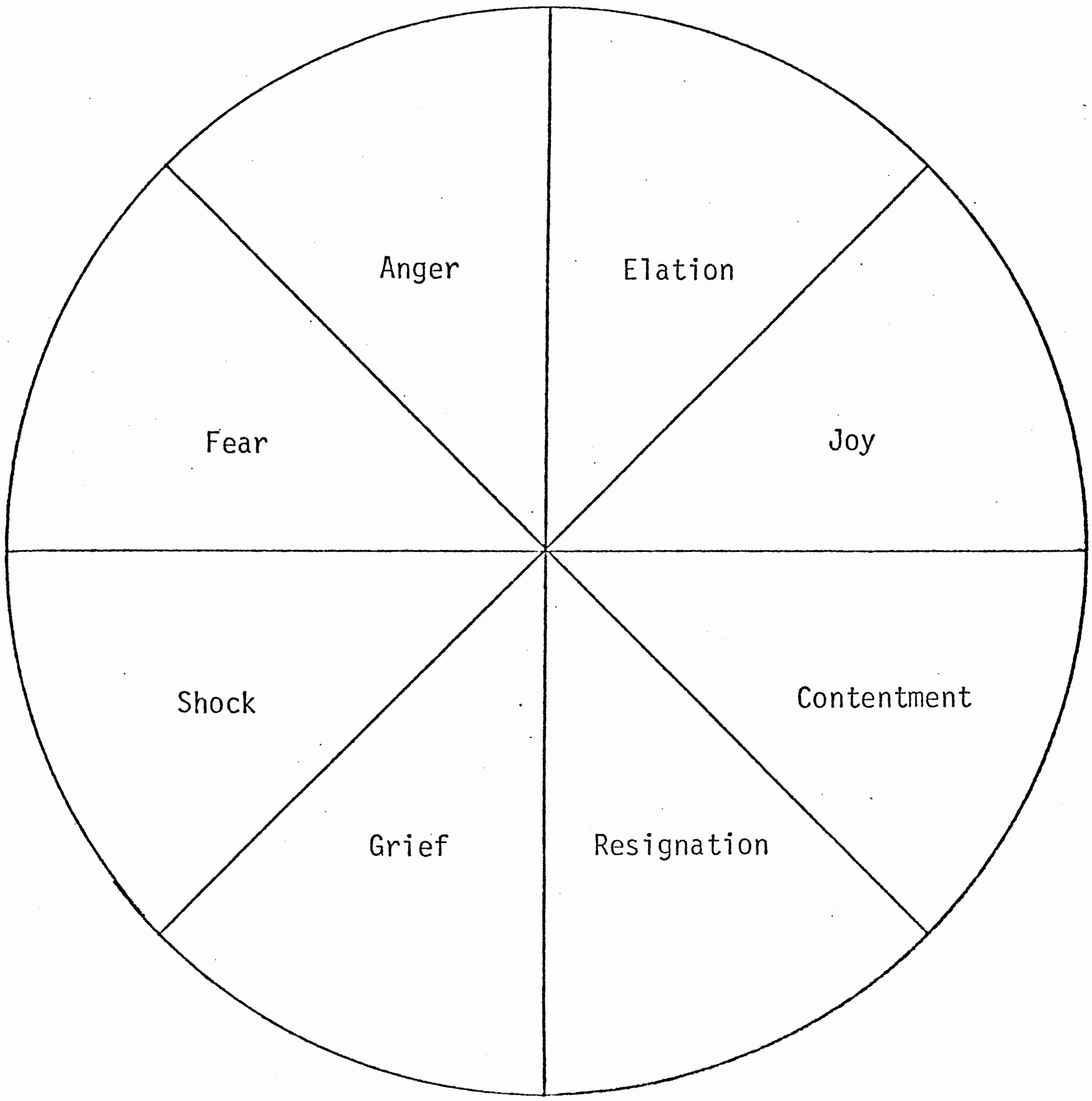


Figure 2. The Circular Ordering of the Emotions

Analysis of Variance and Comparison Tests

The data were next analyzed by means of a three-way analysis of variance: sex of subject X encoding/decoding accuracy X same or opposite sex pairs of communicators. This was performed for each of the affect conditions. Thus a total of eight separate analyses were performed. Cell means for the sex X decoding/encoding interaction and the three-way interaction are presented in Tables IX through XVI. Summary data for all main effects and interactions are presented in Tables XXIII through XXX of Appendix D. Summary data for all _t_ tests are presented in Tables XXXIII through XXXV of Appendix D.

The hypothesis tested by these analyses is that males are more accurate decoders of emotion while females are more accurate encoders, regardless of same or opposite sex pairings. A significant sex X encoding/decoding interaction was predicted as well as a nonsignificant three-way interaction. Furthermore, the form of the interaction was dictated by the hypothesis. Therefore, in order for the data to support the hypothesis, a sex X encoding/decoding interaction must be present, and males must be more accurate decoders than females while females must be more accurate encoders than males. In addition, the form of the interaction must be duplicated for both same and opposite sex pairings.

In order to further clarify some of the interactions, _t_ tests were performed. In the event that a two-way interaction was significant at a probability level $\leq .05$, two _t_ tests were performed. The first _t_ test tested the hypothesis that the decoding accuracy mean for males was significantly greater than the decoding accuracy mean for females, while the second _t_ test tested the hypothesis that the encoding accuracy mean for females was significantly greater than the encoding accuracy mean

TABLE IX

ANALYSIS OF VARIANCE: CELL MEANS FOR ELATION
SEX X DECODING/ENCODING INTERACTION AND
THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	4.33	3.28
	Opp. Sex	3.04	2.61
		3.71	2.94
Males	Same Sex	2.39	1.81
	Opp. Sex	3.67	2.17
		3.03	1.99

TABLE X

ANALYSIS OF VARIANCE: CELL MEANS FOR JOY
SEX X DECODING/ENCODING INTERACTION
AND THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	4.39	2.28
	Opp. Sex	3.97	2.47
		4.18	2.38
Males	Same Sex	3.56	2.75
	Opp. Sex	3.89	2.61
		3.72	2.38

TABLE XI

ANALYSIS OF VARIANCE: CELL MEANS FOR CONTENTMENT
SEX X DECODING/ENCODING INTERACTION AND
THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	4.42	2.72
	Opp. Sex	3.58	3.11
		4.00	2.92
Males	Same Sex	3.33	2.72
	Opp. Sex	3.61	2.03
		3.46	2.38

TABLE XII

ANALYSIS OF VARIANCE: CELL MEANS FOR RESIGNATION
SEX X DECODING/ENCODING INTERACTION AND
THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	3.25	2.58
	Opp. Sex	2.03	2.69
		2.64	2.64
Males	Same Sex	2.53	2.31
	Opp. Sex	2.89	2.61
		2.53	2.46

TABLE XIII

ANALYSIS OF VARIANCE: CELL MEANS FOR GRIEF
SEX X DECODING/ENCODING INTERACTION
AND THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	4.30	3.72
	Opp. Sex	2.25	4.03
		3.28	3.88
Males	Same Sex	1.80	3.00
	Opp. Sex	3.75	3.06
		2.78	3.03

TABLE XIV

ANALYSIS OF VARIANCE: CELL MEANS FOR SHOCK
SEX X DECODING/ENCODING INTERACTION
THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	3.36	2.19
	Opp. Sex	3.58	2.36
		3.47	2.28
Males	Same Sex	3.92	1.31
	Opp. Sex	3.22	1.69
		3.57	1.50

TABLE XV

ANALYSIS OF VARIANCE: CELL MEANS FOR FEAR
SEX X DECODING/ENCODING INTERACTION
AND THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	3.08	2.44
	Opp. Sex	2.17	2.03
		2.62	2.24
Males	Same Sex	1.94	1.72
	Opp. Sex	2.86	2.11
		2.40	1.92

TABLE XVI

ANALYSIS OF VARIANCE: CELL MEANS FOR ANGER
SEX X DECODING/ENCODING INTERACTION
AND THREE-WAY INTERACTION

		Decoding	Encoding
Females	Same Sex	4.86	3.86
	Opp. Sex	3.64	3.44
		4.25	3.65
Males	Same Sex	4.06	3.36
	Opp. Sex	4.69	2.94
		4.38	3.15

for males. Four comparison tests were planned for each three-way interaction. These *t* tests tested the same hypotheses as outlined above. Two *t* tests were applied to the same sex results and the remaining two *t* tests were applied to the opposite sex results. All *t* tests were one-tailed. The α level for both groups of *t* tests was set at .05 for the group. It is important to note the directionality of these *t* tests when examining the results, as apparently large differences are significant only if they are in the appropriate direction.

In only one emotion condition was the two-way interaction significant. This occurred in the shock condition ($F = 4.24$, d.f. = 1,70, $p = .04$). The *t* tests revealed that while the decoding accuracy mean for males was not significantly greater than the decoding accuracy mean for females ($t = -.33$, d.f. = 140, n.s.) the encoding accuracy mean for females was significantly larger than the encoding accuracy mean for males ($t = 2.60$, d.f. = 140, sig.). These means are reported in Table XIV. The three-way interaction in this condition, however, was also found to be significant ($F = 4.46$, d.f. = 1,70, $p = .04$). Of the four *t* tests that were performed on the means for this three-way interaction, only one was found to be significant. This was for same sex pairs of communicators, and females were found to be significantly more accurate encoders than males ($t = 2.44$, d.f. = 140, sig.). The relevant means are located in Table XIV.

This hypothesis, therefore, received only minimal support from the data. The hypothesis, in fact, was rejected at the level of the sex X decoding/encoding interaction for all conditions except shock. Despite the fact that these analyses could have been aborted at this early point, a very interesting finding was uncovered which seemed to deserve further study and clarification. It was found that the F tests for the three-way interactions in all eight emotion conditions were significant at $p \leq .05$ (see Tables XXIII through XXX of Appendix D). It was therefore decided to perform the planned three-way interaction t tests in order to further clarify the data.

The hypothesis predicted that males would be more accurate decoders than females for both same and opposite sex pairs. When same sex pairs were considered, none of the t tests were significant. When opposite sex pairs were studied, however, two t tests revealed that males were more accurate decoders than females. These results were found for grief ($t = -3.95$, d.f. = 140, sig.) and anger ($t = -2.69$, d.f. = 140, sig.). The means for these t tests are located in Tables XIII and XVI, respectively.

The hypothesis also predicted that females would be more accurate encoders than males for both same and opposite sex pairs. When same sex pairs were tested, this prediction was confirmed in the elation ($t = 3.34$, d.f. = 140, sig.) and shock ($t = 2.44$, d.f. = 140, sig.) conditions. The relevant means are found in Tables IX and XIV. Two t tests also confirmed the prediction of the hypothesis when opposite sex pairs were considered. These results were found in the contentment ($t = 2.92$, d.f. = 140, sig.) and grief ($t = 2.55$, d.f. = 140, sig.) conditions. These means are found in Tables XI and XIII.

CHAPTER IV

DISCUSSION

Correlation Results

Perhaps the most fruitful way of examining the correlation results is to consider them to be a preliminary exploration of three of the hypotheses under investigation. These results seem to be relevant to the hypothesis concerning the relationship between nonverbal communication and Neuroticism test scores; the hypothesis concerning the genreality of decoding ability versus the specificity of encoding abilities; and the hypothesis concerning male decoding superiority versus female encoding superiority. If these hypotheses are to be supported by the data, it might be expected that: first, several of the encoding and decoding accuracy scores would be negatively and significantly correlated with Neuroticism; second, several of the decoding accuracy scores would be significantly correlated with each other while few of the encoding accuracy scores would be so correlated; and third, that sex would tend to be positively correlated with several of the decoding accuracy scores and negatively correlated with several of the encoding accuracy scores. An examination of Tables I and II (pages 38-39), however, provides little support for these hypotheses as the expected results were not found.

The first hypothesis states that there is a positive linear relationship between encoding and decoding accuracy (when both are considered together) and mental health (low Neuroticism scale scores). Thus, with the exception of the Neuroticism X total encoding and decoding accuracy correlations, these results do not have a direct bearing on this hypothesis. The above noted correlations, it should be noted, are not significant. Perhaps, some knowledge may be gained concerning the relationship between nonverbal communication and mental health by examining the correlations between the various measures of nonverbal accuracy and Neuroticism. Table I (page 38) reveals that only 1 of 19 possible correlations are significant at $p \leq .05$ (Dec. grief X Neuroticism). Table II (page 39) reveals that only 2 of 38 possible correlations are significant at $p \leq .05$ (both are for females only; Dec. grief X Neuroticism and Enc. fear X Neuroticism). In both cases these are approximately the number of significant correlations that would be expected by chance alone. These results are reminiscent of the early attempts to relate nonverbal communication to mental health (Davitz, 1964; and Thompson and Meltzer, 1964) in the generally low and nonsignificant correlations were found between nonverbal abilities and measures of social and personal adjustment.

The second hypothesis predicts that the intercorrelations among the decoding accuracy scores will tend to be significant while the encoding accuracy intercorrelations will tend to be nonsignificant. Inspection of Table I (page 38) reveals that only 3 of the 28 possible decoding intercorrelations were significant at $p \leq .05$, and that 5 of the 28 possible encoding intercorrelations were significant. While this number of correlations is more than would be expected by chance, the predicted encoding/decoding differences were not found.

The fourth hypothesis, in part, predicts that men are more accurate decoders of emotion while women are more accurate encoders. Once again, the obtained correlation pattern does not tend to support the hypothesis. In fact, sex is correlated negatively with five of the individual emotion categories, and with all three of the total accuracy categories. In no case does sex correlate positively with communicative accuracy at $p \leq .05$. As sex was scored zero for females and one for males, these results indicate that when overall sex differences occur, females tend to be both more accurate encoders and more accurate decoders than males.

Detailed interpretations of these findings will not be offered, as these results are only a preliminary examination of the data and the hypotheses under investigation. It may be noted at this point, however, that the correlation results, by and large, do not provide support for any of the hypotheses.

Regression Analysis Results

The first hypothesis states that there is a positive linear relationship between encoding accuracy and decoding accuracy (when both are considered together) and mental health as measured by scores on the EPI Neuroticism scale. As a result of the significant negative correlation between sex and Neuroticism, three separate regression analyses were performed: one for males, one for females, and one for males and females combined. In the regression analyses total encoding and total decoding accuracy scores, both singularly and in combination, were used in an attempt to predict Neuroticism scale scores.

The results of all three of these analyses failed to support the hypothesis. Neither encoding nor decoding accuracy scores, either alone or in combination, were able to predict Neuroticism scores at levels of probability $\leq .05$. This finding was consistent for all three analyses.

Perhaps the most striking aspect of these findings, in fact, is the generally small F ratios obtained. These results, in combination with the previously mentioned correlation results, lend credence to the pessimistic tone of several of the prior researchers in this area (Cohen and Rau, 1972; Davitz, 1964; Tagiuri, 1969; and Thompson and Meltzer, 1964).

The most obvious interpretation of these results is that accurate nonverbal communication of emotion is not an important aspect of mental health and social adaptation, at least insofar as Neuroticism scale scores reflect these attributes. As noted previously, however, the impetus for the present research was provided by the fact that many theories of psychopathology and mental health assume that nonverbal acuity is an important aspect of adaptive functioning, yet very little research has supported this assumption. Perhaps there is an alternative interpretation of these findings.

The present author took pains in designing this research to comply with the excellent guidelines suggested by Ekman, Friesen, and Ellsworth (1972), and to thereby eliminate many of the methodological errors found in earlier studies. It is possible, nonetheless, that an almost unavoidable methodological flow is responsible for the lack of significant results. It may well be that the laboratory measurement of encoding and decoding accuracy does not directly reflect the encoding and decoding of emotion which occurs in everyday life. While it may be argued that the effects of the laboratory environment are constant across subjects, these effects (if present) may enhance the performance of emotionally troubled subjects more than the performance of better adjusted individuals. For example, Salzman (1973) reports that obsessional individuals restrain their emotional expressiveness. They would be expected, therefore, to be poor encoders. In a laboratory setting, however, the "permission" given or the "demand" made by the experimenter may be sufficient to overcome the usual emotional restraint of these subjects. The well-known work of Orne (1962) concerning the effects of "demand" characteristics is obviously relevant to this expectation. The decoding abilities of other emotionally troubled subjects may also be enhanced. Numerous theorists have declared excessive levels of anxiety to be the sine qua non of neurosis. It has also been reported that anxiety may affect performance in a curvilinear fashion (Spence, 1960). One would expect that many emotionally troubled individuals experience debilitating anxiety in emotionally charged "real life" situations. They would be, therefore, relatively poor decoders. When this anxiety is reduced by both removing the "real life" quality of the emotion being expressed and by placing the individual in an essentially non-interpersonal situation, the decoding accuracy of these subjects may be greatly enhanced. This alternate interpretation of the regression analysis results would preserve intact the assumptions of the theorists, but would essentially deny the importance of the present findings as well as the results of several prior studies. A third alternative might be appropriate.

It seems entirely possible that there is validity in both the controlled laboratory findings and the clinical lore. Perhaps nonverbal communication is an important aspect of mental health, but is only one among many aspects and is not typically, in and of itself, a primary determinant. Thus, while these abilities are important, their importance becomes obscured in research in which differences in these abilities alone are expected to statistically differentiate emotionally troubled from better adjusted individuals. It may well be that inaccurate decoding, for example, is deleterious to the social and emotional functioning of all individuals, but that better adjusted persons are less affected by these errors than are emotionally troubled individuals. This may occur as the result of different processes which follow the decoding errors. Reality testing, in part, is the process whereby individuals assess the validity of their subjective interpretation of events. Ineffective reality testing is socially and emotionally debilitating. Thus the effects of inaccurate decoding by emotionally troubled persons may not be modified by reality testing, but better adjusted individuals may test reality and thereby modify their interpretation and consequent response, and thus avoid compounding the negative effects of inaccurate communication.

It was previously reported that Cohen and Rau (1972) found no differences between the decoding accuracy scores of depressed and nondepressed groups of subjects. This may be interpreted as indicating that decoding errors are not an important component of depression. Beck (1967), however, states that it is not usually the accuracy of the perceptions of the depressed individual that leads to difficulty (except in the case of psychotic depressions). The problem, he asserts, arises in the interpretation of the perception and the tendency of these individuals to assume that the interpretation and the perception are identical, and the tendency to respond on the basis of this assumed similarity. The reality testing process is thereby circumvented, and the effect of erroneous perceptions magnified. Thus while Cohen and Rau's (1972) depressed and nondepressed subjects had similar error rates, i.e., were equally accurate, the consequences of those errors were not similar. Accurate nonverbal communication, therefore, may be of central importance to the relative adjustment level of individuals who suffer from reality testing defects, but may be of only minor consequence to individuals who possess more effective adaptive mechanisms.

Formulations of the type offered above, while rather simplistic, demonstrate a process which is far more complex than has been tested by research in this area. The assumption of a more or less direct relationship between nonverbal accuracy and mental health underlies the design of the present as well as many previous studies. In large part this may be attributed to the fact that this research is still in its infancy. It seems, therefore, that a positive view of the widespread lack of significant results in this area may be offered. These findings clearly demonstrate that a simplistic understanding of the relationship between nonverbal accuracy and mental health is invalid, and that more sophisticated approaches need to be pursued. The present study may be said to have advanced the level of sophistication of research in this area by combining encoding and decoding scores of the same individuals as the measure of nonverbal acuity. Clearly future research should advance this level of sophistication even further.

Factor Analysis Results

The second hypothesis under investigation was tested through the use of factor analysis. This hypothesis states that decoding ability is a general trait while encoding is a series of specific abilities. Two separate factor analyses were used to test this hypothesis, one for decoding and one for encoding. As the goal of factor analysis is to identify common factors, the mathematics involved are such that a general factor, if it exists, will be the first factor identified. Group factors will emerge next, and finally unique factors may be identified. The most stringent test of this hypothesis, therefore, requires that decoding factor I be a general factor, and that all encoding factors be unique factors. Child (1970) indicates that in the absence of variables purposefully selected for their close similarity (i.e., all highly intercorrelated), the emergence of strictly defined general factors is a remote possibility. In addition, the mathematics of factor analysis mitigates against the possibility of no common factors emerging unless, once again, variables are highly selected (this time selected on the basis of having extremely little similarity). A more reasonable expectation of these analyses, an expectation that would support the hypothesis, is that decoding factor I will be a large group factor and the remaining factors will not be unique. Encoding factor I, on the other hand, will be a small, group factor and unique factors will also be found.

Inspection of the results of both factor analyses (Tables VI and VII, page 44) leads to the conclusion that, based on the stringent criteria, both the decoding and encoding aspects of the hypothesis must be rejected. A general decoding factor was not identified, and several encoding group factors were identified. This is not too disheartening, especially when these results are viewed in the light of the mathematical considerations noted above. When the more reasonable criteria are employed as a test of the hypothesis, however, the conclusion to reject the hypothesis remains unchanged. The largest group factor found in either analysis was decoding factor I. This is in line with the predictions of the hypothesis. A factor which includes significant loadsings on only four of eight variables, however, can hardly be called a trend toward a general factor. In addition, decoding factor IV is a unique factor, the only unique factor identified in either analysis. The results of the encoding factor analysis also fail to satisfy the reasonable criteria. Encoding factor I, while not a large group factor, can hardly be called small as it contains three variables with significant loadings. In addition, no unique factors were identified in this analysis.

When examining this hypothesis and the results obtained, it is important to note the author's primary interest in performing these analyses. The hypothesis is of interest in and of itself, of course. What is not apparent when examining this hypothesis is the relationship that it bears to the first hypothesis, the author's main area of interest. In a prior study (Dohne, 1978) in which there were only four emotion conditions, it was discovered that the intercorrelations among the decoding accuracy scores were universally both positive and significant, while the encoding accuracy intercorrelations were of a low magnitude and nonsignificant. The relationship between this finding and the present hypothesis is obvious. These findings, however, led to the speculation that one of the difficulties permeating studies which attempt to relate nonverbal abilities to mental health or to measures of personality is the apparent underlying assumption that the constructs "encoding ability" or "decoding ability" are valid. Other studies attempt to relate encoding or decoding of specific emotions to personality, and ignore the possibility of general abilities. These assumptions seem equally erroneous in light of the author's findings noted above. The speculation was offered that much of the confusion and conflict in this area stem from these assumptions.

With this background in mind, the importance of the present results is highlighted. As neither general nor very large common factors were found for either encoding or decoding, the often used concepts "encoding ability" and "decoding ability" appear to be far too general. At the same time, it seems overly restrictive to speak of "the ability to decode elation" as opposed to "the ability to decode joy." The factor analysis results indicate that when nonverbal communication of emotion is studied, groupings of emotion categories may be warranted. These groupings, it may be noted, are not always groupings that would occur based on "common sense."

Child (1970, p. 48) states that the naming of factors is "an exciting though perilous business." The peril in naming factors is based, in part, on the somewhat arbitrary and inferential nature of the naming process. Variables are grouped on a factor on the basis of an underlying commonality. The procedure does not identify this commonality, only its existence. Factors are named based on a guess as to the nature of this underlying commonality. Primary importance is given to variables with the highest significant loadings, and secondary importance to those with lower, yet still significant loadings. The pattern of nonsignificant loadings may also be examined in an attempt to further substantiate the name chosen. With this caution and these guidelines in mind, the factors identified in this study will be named.

In the decoding analysis four factors were identified. Factor I is composed of elation, joy, contentment, and resignation. This appears to be a "recognition of positive and neutral emotions" factor. While resignation may be phenomenologically slightly more unpleasant than neutral, the "flavor" of this factor seems to be pleasant affect. The second factor is composed of grief and anger. These are emotions with a decidedly negative affective connotation, and this factor may be called "recognition of unpleasant emotions." It is interesting to note that these two factors encompass an often mentioned dimension of emotion, pleasant/unpleasant. Factor III is unusual as it is the only bipolar factor identified in either analysis. A positive loading is found for shock, and a negative loading is found for elation. The positive and negative signs are important only in that they indicate that the factor is bipolar. It does not matter which variable is placed at which end of the continuum. As both shock and elation seem to contain an element of surprise, and surprises vary from pleasant to unpleasant, this factor may be named "recognition of surprise." The final decoding factor is also unusual in that it is a type of factor identified only once in either of the analyses: it is a unique factor. This factor is composed solely of fear, and is easily named "recognition of fear."

In the encoding analysis, as in the decoding analysis, four factors were identified. All four are group factors. Factor I is composed of elation, shock, and fear. The obscurity of the underlying commonality of this factor is troubling, as not only is it the first encoding factor to emerge, but a glance at Table I (page 38) reveals that all three of these encoding emotion conditions are significantly correlated with each other. A close examination of the role playing instructions which were used to elicit these emotions, however, leads to a very tentative conclusion. These instructions all contain a general "excitement" element, indicating arousal of the sympathetic nervous system. This factor may, therefore, be named "display of sympathetic nervous system arousal." It should be noted that the author is not very satisfied with this name, as anger, for example, does not load on this factor while contentment and joy almost reach the criterion level. Perhaps this factor should remain unnamed. The second encoding factor is much clearer, and seems closely related to decoding factor I. This factor is composed of joy, contentment, and resignation. In light of the high loadings on joy and contentment relative to resignation, this factor is named "display of pleasant emotions." Encoding factor III is as difficult to interpret as factor I. It contains a very high loading on anger and a relatively lower loading on shock. This factor may be thought of as representing one aspect of the often reported fight/flight response, and is thus named "display of threat." The final factor, composed of resignation and grief, seems to contain the phenomenologically unpleasant aspect of resignation, and is named "display of sadness."

Accuracy and Error Distribution Results

The third hypothesis under investigation is an exploration of the circular model of the emotions postulated by Fromme (1977). It was predicted that encoding and decoding errors would most likely consist of identification of the intended emotion expressed as an emotion in either of the adjacent categories, the next most frequent errors would be two steps removed, the next most frequent errors would be three steps removed, and the least frequent errors would consist of a choice of the opposite emotion. As very little research has been completed to date which explores this model and predicted pattern of error frequencies, no testing of these predictions was planned beyond the computation and examination of accuracy and error means. In the following discussion, therefore, differences between observed accuracy and error frequencies will be discussed, but these are only apparent and not necessarily statistically significant differences.

The major impression gained from inspection of the table of accuracy and error frequencies (Table VIII, page 46) is that for all emotions, the column which indicates accurate communication, column 0, contins the highest mean frequency for that emotion condition. A second impression is that the highest error frequencies tend to occur in the columns which indicate an identification of the intended emotion expressed as an emotion in either of the adjacent categories. This impression is strengthened by examining the mean encoding, mean decoding, and grand mean categories. These general impressions support at least part of Fromme's (1977) contention. Closer inspection of the data, however, tends to contradict the portion of the hypothesis that predicts symmetrically decreasing error frequencies in categories two, three, and four steps removed from the category in question. In fact, in only three conditions (encoding contentment, decoding contentment, and encoding shock) is the predicted pattern of error frequencies closely approximated. In addition, the model assumes that all adjacent categories are equidistant from each other, and thus errors in decoding elation, for example, should occur with equal frequency in the anger and joy categories. This state of affairs was observed for several of the emotion categories, but a strong tendency for the error distributions to be skewed was also apparent. Finally, a number of emotion categories were found in which very pronounced deviations from the model's predictions were observed. These impressions will be further elaborated below.

There are eight emotions in this circular model, and two modes of nonverbal communication were studied (encoding and decoding) yielding sixteen individual conditions. Of these sixteen conditions, thirteen were found to have the highest error frequencies in either of the categories adjacent to the emotion in question. Encoding contentment, decoding contentment, and encoding shock, as noted above, also have relatively symmetrically decreasing error frequencies as predicted. The remaining ten categories, while providing support for the first part of the hypothesis, do not demonstrate symmetrically decreasing error frequencies. In three conditions (encoding joy, decoding joy, and decoding resignation) the error pattern seems to be that the highest error frequencies are divided equally between the two categories adjacent to the correct category, but all the remaining error categories have error frequencies which are quite low and approximately equal. This suggests that joy and possibly resignation are quite similar to the emotions in the adjacent categories, but to no others. In five conditions a markedly skewed distribution of error frequencies is found. The pattern for these five seems to be that either a vast predominance of errors occur in one of the adjacent categories while very few errors occur in any other category (decoding elation and decoding shock), or the predominance of errors occur with decreasing frequency in either a clockwise or counterclockwise direction while few errors occur in the opposite direction (encoding elation, encoding fear, and decoding fear). These patterns suggest that the emotion in question is similar to one of the adjacent categories, but quite different from the other. In the encoding and decoding grief conditions yet another pattern occurs. As in the previously discussed conditions, errors in the grief conditions occur in an adjacent category. The next most frequent errors, however, occur in a category three steps removed from grief, while all the remaining error frequencies are quite low. This produces a bimodal distribution. It is important to remember that the category which is three steps removed from grief and which produced the second peak in the distribution is anger.

The accuracy and error distributions of the thirteen conditions described above at least partially supported the hypothesis and the model. The remaining three conditions, however, display error distributions which are far different from those predicted. In the encoding resignation condition a bimodal distribution is once again observed. This pattern of error scores is somewhat reminiscent of the grief patterns, but differs in two important respects. First, in the encoding resignation condition the most frequently occurring errors are not found in either of the adjacent categories, and second, the highest frequency of errors in the ± 4 category. The ± 4 category was predicted to contain the fewest errors as the model assumes that this category is an emotion which is most unlike the one in question. This ± 4 category for the resignation condition is anger. Thus, the category which produced the second peak in all three bimodal distributions is the anger condition.

The two categories remaining to be discussed are the two which demonstrate the most apparent deviation from the predicted error patterns. As may be anticipated, these are the encoding and decoding anger conditions. In both of these conditions, the most frequently occurring errors are found in the categories farthest removed from anger (the -3 and the ± 4 categories), while all the remaining error categories display frequencies which are almost exactly opposite to the predictions of the hypothesis. As may be expected from the previously discussed bimodal distributions, when anger is the emotion in question, the -3 category is grief and the ± 4 category is resignation. It seems, therefore, that all five of the multimodal distributions observed are produced as a result of similarities between anger, grief, and resignation not predicted by the model.

As mentioned earlier these results were intended to be more of a preliminary exploration than a strict statistical test of Fromme's (1977) model. Such a strict testing would seem to be premature. Thus, while the overall hypothesis would have to be rejected based on the present findings, there are several aspects of these results which are encouraging. A possible flaw in the model, the placement of the emotion anger, has also been discovered. This flaw might be rectified and lead to even more positive results.

Perhaps the most encouraging finding is most easily observed in the mean encoding, mean decoding, and grand mean accuracy and error distributions. It may be noted in all three of these distributions that the most frequent errors occur in the two categories directly adjacent to the category which represents accurate nonverbal communication. This was also noted for several of the individual emotion conditions. In addition, symmetry is noted in these distributions as well as in several of the individual emotion distributions. The expected decreasing error frequencies in categories beyond the adjacent ones, however, were not observed.

The location of the emotion anger in the model would seem to be questionable. It is apparent that anger, at least in terms of nonverbal communication, is far more similar to grief and resignation than the model proposes. In addition to the multimodal distributions found for anger, grief, and resignation, other data support this contention. The present model placed anger adjacent to elation and fear, but inspection of the error distributions in these conditions indicates that neither fear nor elation are frequently miscommunicated as anger. In fact, it may well be that the skewed distributions noted in the elation and fear conditions may be partially attributable to the placement of anger adjacent to these emotions.

Analysis of Variance Results

The fourth and final hypothesis states that men are more accurate decoders of emotion while women are more accurate encoders, regardless of same or opposite sex pairings. This hypothesis was tested, in part, by eight separate three-way analyses of variance, one for each emotion condition. One-tailed t tests were also planned. In order for the hypothesis to be completely supported by the data, four criteria must be met. First, a significant sex X encoding/decoding interaction must be found; second, t tests must confirm the form of this interaction as males must be more accurate decoders than females and females must be more accurate encoders than males; third, the three-way interaction must be nonsignificant; and fourth, t tests must confirm that the form of the above noted two-way interaction is duplicated for both same and opposite sex pairs. These criteria were not met in any of the eight emotion conditions, as only one two-way interaction was significant and all eight three-way interactions were significant. The results, therefore, indicate that the hypothesis must be rejected. Even the significant two-way interaction (found in the shock condition) provides very little support for the hypothesis, as the t tests revealed that females were significantly more accurate encoders than males, but males were not significantly more accurate decoders than females. In addition, the significant three-way interaction in this condition and the results of the t tests performed revealed that only in the same sex condition were females significantly more accurate encoders.

In view of the gross lack of support for this hypothesis, these results may be interpreted as further evidence that sex differences in the ability to nonverbally communicate emotions do not exist (at least not in the form predicted by the hypothesis). The present author, however, strongly agrees with the sentiment expressed by Zaidel and Mehrabian (1969, p. 234) that this "issue remains open to further evidence." The results, therefore, will be more closely examined in the hope that some further light may be shed on the previously noted controversies in this area.

Perhaps the most striking finding in the analysis of variance results was the fact that all eight of the three-way interactions were significant. Both the universality of this finding and the rather low p level reported indicate that these results deserve closer examination. The most obvious interpretation of these significant three-way interactions is that the concepts "female decoding superiority," "female encoding superiority," "male decoding superiority," and "male encoding superiority" are over-generalizations. These three-way interactions indicate that when significant sex main effects or sex X decoding/encoding interactions are found, the resulting general statements concerning the effects of sex on nonverbal acuity must be qualified in light of other variables present, namely whether or not same or opposite sex pairs were studied.

This finding helps to clarify the possible source of the conflicting results previously reported in the literature, as well as the absence of consensus concerning the trend that females are more accurate nonverbal communicators than males. Thus, while Buck et al. (1972) report that females are more accurate communicators than males, Buck, Miller, and Caul (1974) report that females are not more accurate decoders than males. These conflicting results may be attributed to the fact that the 1972 study reported data on same sex pairs, but the 1974 study included both same and opposite sex pairings. In fairness to these authors, it must be pointed out that their discussions of their results as well as the change in design indicates a recognition that sex main effects must be qualified by not only encoding/decoding effects, but also by the effects of either same or opposite sex pairings. The results of the present study, therefore, support that which these investigators apparently recognized.

Many researchers in their preliminary attempts to resolve the question concerning sex differences only considered the sex differences of the subjects under study. This procedure is similar to the discussion of the correlation results previously elaborated in this paper in which sex differences were encountered. Later research efforts seem to have assumed that overall sex differences may need to be qualified in light of encoding/decoding effects. This is apparent in the form of the present hypothesis. Even studies which take encoding/decoding effects into account often ignore same or opposite sex pairings. In fact, only a very few researchers report results in which the effect of same/opposite sex pairings is systematically taken into account. Zuckerman and his colleagues (1975, 1976) are included in this latter group. It seems, therefore, that research in the area of sex differences is becoming more sophisticated as the importance of same/opposite sex pairings, as well as the importance of encoding and decoding aspects of nonverbal communication, become better established.

Given the above, it seems that the three-way interactions found in this study should be further explored through the use of the planned *t* tests, even though the hypothesis was rejected at the level of the sex X encoding/decoding interaction. A productive way of organizing and examining these results is suggested by the fact that the three-way interactions were all significant. Sex differences will be examined as these are influenced by either encoding or decoding and same and opposite sex pairings.

The hypothesis predicted that males would be more accurate decoders than females when same sex pairs were considered. This result was not obtained in any of the eight emotion conditions. It is interesting to note, however, that had this hypothesis been reversed and female decoding superiority been predicted, five of the *t* tests would have been significant (elation, contentment, resignation, grief, and fear). A trend may therefore exist for female pairs to decode more accurately than male pairs. This result has previously been reported (Buck et al., 1972). The hypothesis also predicted that males would be more accurate decoders than females when opposite sex pairs were considered. Some support for this aspect of the hypothesis was provided by the *t* tests, as males were found to be more accurate decoders than females in the grief and anger conditions. Additionally, no reversals such as those noted above were found.

Females were predicted to be more accurate decoders than males for both same and opposite sex pairings. For same sex pairs, the *t* tests supported the hypothesis in the elation and shock conditions. For opposite sex pairs similar results were found as significant *t* tests were obtained in both the contentment and grief conditions. Finally, it may be noted in passing that in the encoding conditions, none of the *t* tests would have provided support for a reversed hypothesis (i.e., males more accurate encoders than females).

Concluding Remarks

Prior to drawing general conclusions about the results obtained in the present study, it seems appropriate to put these results in the proper frame. This study was designed to conform to not only the present level of sophistication in this area, but to also comply with the methodological guidelines recommended by a group who is among the leading experts in nonverbal communication (Ekman, Friesen, and Ellsworth, 1972). While the methodology may be criticized, of course, this design does appear to be basically sound. The author would also like to state his opinion that results which do not support the hypotheses under investigation are not without value. With this general context in mind some concluding remarks can be made.

The most obvious conclusion that can be drawn from the present study is that research in this area is still in its infancy and the need for more sophisticated approaches is apparent. Scarcely a handful of studies has explored the relationship between nonverbal acuity and mental health or measures of personality. The author knows of no prior studies in which encoding and decoding scores of the same individual have been used in an attempt to predict scores on tests measuring social and personal adjustment. As research in this area is becoming more advanced, however, it appears that this relationship is much more complex than previous studies have hypothesized. A similar conclusion can be drawn from the results concerning sex differences. While this particular aspect of the nonverbal area has been studied in greater detail, the effects of same/opposite sex pairings is just beginning to be recognized. Very few studies have been attuned to these effects, and the present results clearly indicate that these same/opposite sex differences are very important. In a similar vein, factor analytic research has obviously been needed, yet has not been done until the present. The concepts "decoding ability" and "encoding ability" appear frequently in the literature, and yet the present results deny the validity of either of these constructs. Perhaps it is to be expected that research which focuses on the frontiers of knowledge is often frustrating and replete with overgeneralizations and misconceptions. The greatest contribution of the present study may well be that some additional light has been shed and another blind alley or two eliminated.

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APPENDIX A

THE EYSENCK PERSONALITY INVENTORY

The Eysenck Personality Inventory (EPI) is a 57-item, yes-no, self-report inventory which was developed by H. J. Eysenck, and is essentially a revision of the older Maudsley Personality Inventory (MPI). Cline (1975) reports that the major differences between the two inventories are (1) the EPI has two equivalent forms while the MPI has only one; (2) some of the MPI items have been rewritten and others changed in order to reduce the correlations between the two major scales, and (3) a Lie Scale (adapted from the MMPI) has been added to the EPI. The similarities between the two scales are so striking that Eysenck and Eysenck (1963) reason that the validation data for the MPI may also be used as support for the EPI. Test-retest reliabilities are reported to range between 0.80 and 0.97, while correlations between the two forms are reported to range between 0.75 to 0.91 (Cline, 1975).

The two major scales on the EPI are E (extraversion-introversion) and N (neuroticism-stability). Each scale is composed of 24 items, while the shorter L (lie) scale is composed of 9 items. The mean score on extraversion is 13.7 (S.D. = 4.1), while the mean score on neuroticism is 10.9 (S.D. = 4.7). Lanyon (1975) unequivocably states that the EPI accurately measures Eysenck's concepts of extraversion and neuroticism, and Cline (1975, p. 380) reports that "something in excess of 30,000 subjects" were employed in the factor analytic research which ultimately led to the E and N dimensions. The "super factor" that Eysenck calls E is similar to the concept of extraversion discussed by Jung. Those scoring high on E are described as outgoing, impulsive, uninhibited, and having many social contacts; those scoring low are described in opposite terms, i.e., quiet, retiring, introspective, reserved, and distant. Lanyon (1975) cautions that Eysenck's concept of extraversion is more closely related to the European definition of this term (impulsiveness and weak superego controls) than to the American conception (sociability), but adds that the item content of the scale suggests a strong sociability component. Those scoring high on the N scale are described as emotionally unstable and over-responsive, as having difficulty returning to a serene state following an emotional experience, as being prone to somatic distress, and as predisposed to neurotic disorders when placed under stressful conditions. Low scorers on this scale are described as better adjusted and more emotionally stable than high scorers.

APPENDIX B

CORRELATION MATRIX AND FACTOR LOADINGS

TABLE XVII

INTERCORRELATION OF ALL VARIABLES

Variable	Sex		Extraversion		Neuroticism		Lie	
Sex	---	---	---	---	---	---	---	---
Extraversion	r = -.10	p = .42	---	---	---	---	---	---
Neuroticism	r = -.26	p = .03	r = .03	p = .79	---	---	---	---
Lie	r = .02	p = .86	r = -.15	p = .21	r = .03	p = .82	---	---
Dec. Elation	r = -.27	p = .02	r = .17	p = .15	r = .03	p = .80	r = .07	p = .58
Dec. Joy	r = -.22	p = .06	r = -.06	p = .65	r < -.01	p = .95	r = -.08	p = .49
Dec. Contentment	r = -.26	p = .03	r = -.09	p = .45	r = .03	p = .78	r = -.02	p = .86
Dec. Resignation	r = -.05	p = .68	r = -.09	p = .47	r = -.16	p = .18	r = .02	p = .88
Dec. Grief	r = -.29	p = .01	r = .15	p = .21	r = .23	p = .05	r = .18	p = .13
Dec. Shock	r = .05	p = .66	r = -.12	p = .30	r = .06	p = .63	r = .05	p = .67
Dec. Fear	r = -.10	p = .39	r = .21	p = .07	r = -.02	p = .90	r = -.19	p = .11
Dec. Anger	r = .08	p = .51	r = -.05	p = .66	r = -.05	p = .70	r = -.01	p = .90
Total Dec.	r = -.33	p > .01	r = .05	p = .66	r = .03	p = .82	r = -.01	p = .46
Enc. Elation	r = -.23	p = .05	r = -.04	p = .74	r = -.10	p = .42	r = .12	p = .31
Enc. Joy	r = .09	p = .43	r = .10	p = .40	r < -.01	p = .98	r = .09	p = .45
Enc. Contentment	r = -.17	p = .14	r = .11	p = .38	r = .03	p = .81	r = -.06	p = .59
Enc. Resignation	r = -.05	p = .67	r = .14	p = .24	r = -.09	p = .47	r = .02	p = .89
Enc. Grief	r = -.22	p = .06	r = .06	p = .60	r = .04	p = .74	r = -.04	p = .76
Enc. Shock	r = -.25	p = .04	r = -.01	p = .93	r = -.01	p = .92	r = .08	p = .52
Enc. Fear	r = -.11	p = .37	r = -.18	p = .13	r = -.14	p = .25	r = .08	p = .53
Enc. Anger	r = -.13	p = .29	r = .24	p = .04	r = -.05	p = .69	r = -.04	p = .76
Total Enc.	r = -.31	p > .01	r = .14	p = .22	r = -.11	p = .36	r = .06	p = .63
Total Enc. and Dec.	r = -.41	p > .01	r = .14	p = .24	r = -.07	p = .54	r = .04	p = .72

TABLE XVII (Continued)

Variable	Decoding Elation		Decoding Joy		Decoding Contentment		Decoding Resignation	
Dec. Elation	---	---	---	---	---	---	---	---
Dec. Joy	r = .31	p = .01	---	---	---	---	---	---
Dec. Contentment	r = .08	p = .50	r = .20	p = .08	---	---	---	---
Dec. Resignation	r = .27	p = .02	r = .15	p = .21	r = .21	p = .08	---	---
Dec. Grief	r = .14	p = .25	r = -.10	p = .42	r = -.02	p = .87	r = -.02	p = .86
Dec. Shock	r = -.23	p = .06	r = .07	p = .58	r = -.09	p = .44	r = .01	p = .42
Dec. Fear	r = -.04	p = .76	r = .03	p = .79	r = -.08	p = .52	r = .10	p = .42
Dec. Anger	r = -.03	p = .82	r = -.06	p = .61	r = .01	p = .95	r = .00	p = .99
Total Dec.	r = .53	p < .01	r = .52	p < .01	r = .41	p < .01	r = .56	p < .01
Enc. Elation	r = .17	p = .16	r = .01	p = .92	r = .14	p = .23	r = .15	p = .22
Enc. Joy	r = .09	p = .45	r = .09	p = .44	r = .05	p = .70	r = -.03	p = .83
Enc. Contentment	r = .22	p = .06	r = .05	p = .69	r = .13	p = .27	r = -.09	p = .46
Enc. Resignation	r = .02	p = .90	r = .17	p = .16	r = -.06	p = .61	r = .06	p = .63
Enc. Grief	r = -.24	p = .04	r = -.01	p = .92	r = -.24	p = .04	r = -.17	p = .14
Enc. Shock	r = -.02	p = .87	r = .07	p = .55	r = .24	p = .04	r = .04	p = .75
Enc. Fear	r = .10	p = .39	r = .09	p = .47	r = .13	p = .30	r = -.01	p = .96
Enc. Anger	r = .01	p = .92	r = .16	p = .17	r = .17	p = .15	r = .13	p = .29
Total Enc.	r = .09	p = .44	r = .19	p = .11	r = .16	p = .17	r = .04	p = .76
Total Dec. and Enc.	r = .32	p < .01	r = .39	p < .01	r = .32	p = .01	r = .29	p = .01

	Decoding Grief		Decoding Shock		Decoding Fear		Decoding Anger	
Dec. Grief	--	---	---	---	---	---	---	---
Dec. Shock	r = .07	p = .59	---	---	---	---	---	---
Dec. Fear	r = -.01	p = .92	r = .02	p = .89	---	---	---	---
Dec. Anger	r = .28	p = .02	r = .05	p = .66	r = .10	p = .46	---	---
Total Dec.	r = .34	p < .01	r = .22	p = .06	r = .35	p < .01	r = .32	p = .01

TABLE XVII (Continued)

Variable	Decoding Grief		Decoding Shock		Decoding Fear		Decoding Anger	
Enc. Elation	r = .02	p = .84	r = -.14	p = .23	r = -.02	p = .85	r = -.05	p = .67
Enc. Joy	r = -.05	p = .66	r = .02	p = .88	r = -.06	p = .62	r = .05	p = .68
Enc. Contentment	r = .03	p = .81	r = .03	p = .82	r = .10	p = .42	r = .19	p = .10
Enc. Resignation	r = -.02	p = .87	r = -.16	p = .17	r = .03	p = .81	r = -.01	p = .93
Enc. Grief	r = .03	p = .77	r = -.02	p = .87	r = .15	p = .21	r = -.03	p = .80
Enc. Shock	r = .03	p = .81	r = -.01	p = .96	r = .17	p = .15	r = -.00	p = .98
Enc. Fear	r = -.05	p = .69	r = .03	p = .81	r = .09	p = .47	r = -.08	p = .50
Enc. Anger	r = -.07	p = .57	r = .03	p = .82	r = .36	p < .01	r = -.05	p = .70
Total Enc.	r = -.02	p = .86	r = -.08	p = .50	r = .24	p = .04	r = -.00	p = 1.0
Total Dec. and Enc.	r = .14	p = .24	r = .04	p = .76	r = .35	p < .01	r = .15	p = .21

Variable	Total Decoding		Encoding Elation		Encoding Joy		Encoding Contentment	
Total Dec.	---	---	---	---	---	---	---	---
Enc. Elation	r = .10	p = .39	---	---	---	---	---	---
Enc. Joy	r = .05	p = .69	r = -.04	p = .74	---	---	---	---
Enc. Contentment	r = .20	p = .10	r = .08	p = .53	r = .22	p = .07	---	---
Enc. Resignation	r = .01	p = .92	r = .04	p = .75	r = .19	p = .11	r = .08	p = .51
Enc. Grief	r = -.18	p = .13	r = -.04	p = .77	r = -.04	p = .75	r = -.13	p = .29
Enc. Shock	r = .16	p = .17	r = .34	p < .01	r = -.18	p = .14	r = .20	p = .09
Enc. Fear	r = .11	p = .36	r = .29	p = .01	r = -.27	p = .02	r = .14	p = .25
Enc. Anger	r = .25	p = .04	r = -.06	p = .61	r = .06	p = .64	r = .02	p = .90
Total Enc.	r = .20	p = .09	r = .50	p < .01	r = .27	p = .02	r = .42	p < .01
Total Dec. and Enc.	r = .62	p < .01	r = .46	p < .01	r = .24	p = .04	r = .43	p < .01

TABLE XVII (Continued)

Variable	Encoding Resignation		Encoding Grief		Encoding Shock		Encoding Fear	
Enc. Resignation	---	---	---	---	---	---	---	---
Enc. Grief	r = .08	p = .50	---	---	---	---	---	---
Enc. Shock	r = -.05	p = .65	r = -.03	p = .81	---	---	---	---
Enc. Fear	r = .12	p = .33	r = .06	p = .64	r = .42	p < .01	---	---
Enc. Anger	r = -.01	p = .93	r = -.04	p = .77	r = .33	p < .01	r = .02	p = .89
Total Enc.	r = .41	p < .01	r = .28	p = .02	r = .59	p < .01	r = .47	p < .01
Total Dec. and Enc.	r = .34	p < .01	r = .14	p = .23	r = .54	p < .01	r = .42	p < .01

	Encoding Anger		Total Encoding		Total Encoding and Decoding	
Enc. Anger	---	---	---	---	---	---
Total Enc.	r = .42	p < .01	---	---	---	---
Total Dec. and Enc.	r = .45	p < .01	r = .89	p < .01	---	---

TABLE XVIII

VARIMAX ROTATED FACTOR LOADINGS FOR DECODING

Emotion	Factor I	Factor II	Factor III	Factor IV
Elation	.53	.17	-.59	-.01
Joy	.73	-.14	.08	.00
Contentment	.57	.00	-.01	-.32
Resignation	.64	.04	-.08	.27
Grief	-.03	.83	-.06	-.11
Shock	.12	.12	.90	.02
Fear	.03	.03	.02	.93
Anger	-.03	.75	.10	.15
(Proportions)	.19	.17	.15	.13

TABLE XIX

VARIMAX ROTATED FACTOR LOADINGS FOR ENCODING

Emotion	Factor I	Factor II	Factor III	Factor IV
Elation	.70	.07	-.14	-.08
Joy	-.32	.77	.04	.00
Contentment	.30	.63	.06	-.30
Resignation	.13	.56	-.10	.58
Grief	-.01	-.17	.03	.81
Shock	.67	-.04	.55	-.10
Fear	.79	-.09	.06	.18
Anger	-.06	-.05	.94	.02
(Proportions)	.22	.17	.15	.14

APPENDIX C

REGRESSION ANALYSIS SUMMARY TABLES

TABLE XX

LINEAR REGRESSION ANALYSIS SUMMARY TABLE FOR MALES

Source	d.f.	S.S.	F	p
Decoding Accuracy	1,33	27.32	1.25	.27
Decoding Accuracy in Addition to Encoding Accuracy	1,33	17.42	.80	.38
Encoding Accuracy in Addition to Decoding Accuracy	1,33	14.54	.66	.42
Encoding Accuracy	1,33	24.43	1.12	.30

TABLE XXI

LINEAR REGRESSION ANALYSIS SUMMARY TABLE FOR FEMALES

Source	d.f.	S.S.	F	p
Decoding Accuracy	1,33	6.06	.30	.59
Decoding Accuracy in Addition to Encoding Accuracy	1,33	2.76	.14	.71
Encoding Accuracy in Addition to Decoding Accuracy	1,33	43.35	2.17	.15
Encoding Accuracy	1,33	46.65	2.34	.14

TABLE XXII

LINEAR REGRESSION ANALYSIS SUMMARY TABLE
FOR MALES AND FEMALES COMBINED

Source	d.f.	S.S.	F	p
Decoding Accuracy	1,71	1.15	.05	.82
Decoding Accuracy in Addition to Encoding Accuracy	1,71	3.96	.18	.68
Encoding Accuracy in Addition to Decoding Accuracy	1,71	21.38	.95	.33
Encoding Accuracy	1,71	18.57	.82	.37

APPENDIX D

ANALYSIS OF VARIANCE SUMMARY TABLES, CELL MEANS FOR ALL MAIN EFFECTS AND INTERACTIONS, AND t TEST TABLES

TABLE XXIII

ANALYSIS OF VARIANCE: ELATION MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	48.35	7.88	.01
Dec/Enc	1,70	58.68	11.67	>.01
Sex * Dec/Enc	1,70	1.39	.28	.60
Same/Opposite	1,70	.35	.40	.53
Sex * Sa/Op	1,70	56.89	65.54	>.01
Dec/Enc * Sa/Op	1,70	.50	.68	.41
Sex * Dec/Enc * Sa/Op	1,70	10.12	13.80	>.01

TABLE XXIV

ANALYSIS OF VARIANCE: JOY MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	.40	.10	.75
Dec/Enc	1,70	145.92	43.59	>.01
Sex * Dec/Enc	1,70	10.50	3.14	.08
Same/Opposite	1,70	>.01	.00	.96
Sex * Sa/Op	1,70	.78	.69	.41
Dec/Enc * Sa/Op	1,70	.09	.08	.77
Sex * Dec/Enc * Sa/Op	1,70	5.28	5.04	.03

TABLE XXV

ANALYSIS OF VARIANCE: CONTENTMENT MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	20.59	5.56	.02
Dec/Enc	1,70	85.59	27.27	>.01
Sex * Dec/Enc	1,70	.00	.00	.97
Same/Opposite	1,70	3.34	2.25	.14
Sex * Sa/Op	1,70	.00	.00	.96
Dec/Enc * Sa/Op	1,70	.28	.22	.64
Sex * Dec/Enc * Sa/Op	1,70	21.67	17.18	>.01

TABLE XXVI

ANALYSIS OF VARIANCE: RESIGNATION MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	1.53	.33	.57
Dec/Enc	1,70	.09	.02	.89
Sex * Dec/Enc	1,70	.09	.02	.89
Same/Opposite	1,70	.03	.04	.85
Sex * Sa/Op	1,70	20.59	24.37	>.01
Dec/Enc * Sa/Op	1,70	3.78	2.78	.10
Sex * Dec/Enc * Sa/Op	1,70	13.78	10.13	>.01

TABLE XXVII

ANALYSIS OF VARIANCE: GRIEF MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	32.67	7.78	.01
Dec/Enc	1,70	12.92	2.93	.09
Sex * Dec/Enc	1,70	2.17	.49	.48
Same/Opposite	1,70	.28	.26	.61
Sex * Sa/Op	1,70	63.28	59.31	>.01
Dec/Enc * Sa/Op	1,70	1.00	.95	.33
Sex * Dec/Enc * Sa/Op	1,70	81.28	76.92	>.01

TABLE XXVIII

ANALYSIS OF VARIANCE: SHOCK MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	8.34	2.53	.12
Dec/Enc	1,70	191.75	58.95	>.01
Sex * Dec/Enc	1,70	13.78	4.24	.04
Same/Opposite	1,70	.03	.03	.87
Sex * Sa/Op	1,70	2.17	1.75	.19
Dec/Enc * Sa/Op	1,70	4.75	3.63	.06
Sex * Dec/Enc * Sa/Op	1,70	5.84	4.46	.04

TABLE XXIX

ANALYSIS OF VARIANCE: FEAR MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	5.28	1.41	.24
Dec/Enc	1,70	13.78	4.26	.04
Sex * Dec/Enc	1,70	.17	.05	.82
Same/Opposite	1,70	.00	.00	.95
Sex * Sa/Op	1,70	31.34	30.09	>.01
Dec/Enc * Sa/Op	1,70	.00	.00	.95
Sex * Dec/Enc * Sa/Op	1,70	4.75	4.79	.03

TABLE XXX

ANALYSIS OF VARIANCE: ANGER MAIN EFFECTS AND INTERACTIONS

Source	d.f.	S.S.	F Value	Prob.
Sex	1,70	2.53	.56	.46
Dec/Enc	1,70	59.59	12.48	>.01
Sex * Dec/Enc	1,70	7.03	1.47	.23
Same/Opposite	1,70	9.03	8.09	.01
Sex * Sa/Op	1,70	15.59	13.96	>.01
Dec/Enc * Sa/Op	1,70	.28	.27	.61
Sex * Dec/Enc * Sa/Op	1,70	15.59	14.77	>.01

TABLE XXXI

ANALYSIS OF VARIANCE: CELL MEANS FOR MAIN EFFECTS AND SEX X SAME/OPPOSITE, AND DECODING/ENCODING X SAME/OPPOSITE INTERACTIONS FOR ELATION, JOY, CONTENTMENT, AND RESIGNATION

Variable	Elation	Joy	Contentment	Resignation
Males	2.51	3.20	2.92	2.64
Females	3.33	3.28	3.46	2.49
Decoding	3.37	3.95	3.74	2.58
Encoding	2.47	2.53	2.65	2.55
Same Sex	2.95	3.24	3.30	2.58
Opposite Sex	2.88	3.24	3.08	2.56
Males, Same Sex	2.10	3.15	3.03	2.24
Females, Same Sex	3.81	3.33	3.57	2.92
Males, Opposite Sex	2.92	3.25	2.82	2.75
Females, Opposite Sex	2.85	3.22	3.35	2.36
Decoding, Same Sex	3.36	3.97	3.88	2.71
Decoding, Opposite Sex	3.38	3.93	3.60	2.46
Encoding, Same Sex	2.54	2.51	2.72	2.44
Encoding, Opposite Sex	2.39	2.54	2.57	2.65

TABLE XXXII

ANALYSIS OF VARIANCE: CELL MEANS FOR MAIN EFFECTS AND SEX X SAME/OPPOSITE AND DECODING/ENCODING X SAME/OPPOSITE INTERACTIONS FOR GRIEF, SHOCK, FEAR, AND ANGER

Variable	Grief	Shock	Fear	Anger
Males	2.90	2.53	2.16	3.76
Females	3.58	2.88	2.43	3.95
Decoding	3.03	3.52	2.51	4.31
Encoding	3.45	1.89	2.08	3.40
Same Sex	3.21	2.69	2.30	4.03
Opposite Sex	3.27	2.72	2.29	3.86
Males, Same Sex	2.40	2.61	1.83	3.71
Females, Same Sex	4.01	2.78	2.76	4.36
Males, Opposite Sex	3.40	2.46	2.49	3.82
Females, Opposite Sex	3.14	2.97	2.10	3.54
Decoding, Same Sex	3.06	3.64	2.51	4.46
Decoding, Opposite Sex	3.00	3.40	2.51	4.17
Encoding, Same Sex	3.36	1.75	2.08	3.61
Encoding, Opposite Sex	3.54	2.03	2.07	3.19

TABLE XXXIII

ANALYSIS OF VARIANCE: CELL MEANS FOR SEX X DECODING/ENCODING INTERACTION AND *t* TEST RESULTS (α = .05, *d.f.* = 140)

	Decoding				Encoding			
	Males	Females	*t*	Sig. or N.S.	Males	Females	*t*	Sig. or N.S.
Elation	3.03	3.71	1.74	N.S.	1.99	2.94	2.44	Sig.
Joy	3.72	4.18	1.45	N.S.	2.68	2.38	.95	N.S.
Contentment	3.47	4.00	1.71	N.S.	2.38	2.92	1.74	N.S.
Resignation	2.53	2.64	.31	N.S.	2.46	2.64	.51	N.S.
Grief	2.78	3.28	1.43	N.S.	3.03	3.88	2.43	Sig.
Shock	3.57	3.47	-.33	N.S.	1.50	2.28	2.60	Sig.
Fear	2.40	2.62	.71	N.S.	1.92	2.24	1.03	N.S.
Anger	4.38	4.25	-.36	N.S.	3.15	3.65	1.39	N.S.

TABLE XXXIV

ANALYSIS OF VARIANCE: SAME SEX CELL MEANS FOR THREE-WAY INTERACTION AND *t* TEST RESULTS ($\alpha = .05$, *d.f.* = 140)

	Decoding				Encoding			
	Males	Females	*t*	Sig. or N.S.	Males	Females	*t*	Sig. or N.S.
Elation	2.39	4.33	4.34	N.S.	1.81	3.28	3.34	Sig.
Joy	3.56	4.39	2.18	N.S.	2.75	2.28	-1.24	N.S.
Contentment	3.33	4.42	2.95	N.S.	2.72	2.72	---	N.S.
Resignation	2.17	3.25	2.63	N.S.	2.31	2.58	.66	N.S.
Grief	1.80	4.30	6.58	N.S.	3.00	3.72	1.11	N.S.
Shock	3.92	3.36	-1.56	N.S.	1.31	2.19	2.44	Sig.
Fear	1.94	3.08	3.08	N.S.	1.72	2.44	1.95	N.S.
Anger	4.06	4.86	2.05	N.S.	3.36	3.86	1.28	N.S.

TABLE XXXV

ANALYSIS OF VARIANCE: OPPOSITE SEX CELL MEANS FOR THREE-WAY INTERACTION AND *t* TEST RESULTS (α = .05, *d.f.* = 140)

	Decoding				Encoding			
	Males	Females	*t*	Sig. or N.S.	Males	Females	*t*	Sig. or N.S.
Elation	3.67	3.08	-1.34	N.S.	2.17	2.61	1.00	N.S.
Joy	3.89	3.97	.21	N.S.	2.61	2.47	-.37	N.S.
Contentment	3.61	3.58	-.08	N.S.	2.03	3.11	2.92	Sig.
Resignation	2.89	2.03	-2.10	N.S.	2.61	2.69	.20	N.S.
Grief	3.75	2.25	-3.95	Sig.	3.06	4.03	2.55	Sig.
Shock	3.22	3.58	1.00	N.S.	1.69	2.36	1.86	N.S.
Fear	2.86	2.17	-1.86	N.S.	2.11	2.03	-.22	N.S.
Anger	4.69	3.64	-2.69	Sig.	2.94	3.44	1.28	N.S.

2

VITA

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