

ANXIETY AND THE PERCEPTION OF EMOTION:

The Ability of Grade Four Children to Discriminate
Multiple Emotional Speech Messages as a Function of
Trait Anxiety

by

Miles A. Kowall

A thesis
presented to the University of Manitoba
in partial fulfillment of the
requirements for the degree of
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ABSTRACT

The present investigation concerned effects of children's trait anxiety on discrimination of three types of multiple emotional messages: congruent, in which tone of voice (vocal channel) matched statements (verbal channel); incongruent, in which tone differed from statements; and conflicting, in which tone opposed statements.

Theoretical considerations and research about anxiety and the perception of emotion yielded three hypotheses for effects in both the vocal and the verbal channels: (1) As anxiety increased, overall discrimination accuracy would decrease. (2) Congruent messages would be discriminated most accurately, incongruent messages less accurately, and conflicting messages least accurately. (3) As anxiety increased, discrimination accuracy for congruent, incongruent and conflicting messages would decrease to a small, moderate, and large extent, respectively.

Grade four boys and girls were assigned to low, moderate, and high anxiety groups on the basis of test scores. They listened to messages, spoken by women or men, containing five emotional statements said in five tones of voice. Statements and tones of voice were either happy, angry, sad, loving, or neutral. Subjects indicated speakers' meaning by choosing among five stick figures depicting the emotions.

Accuracy of discrimination in each channel was measured by the correspondence between chosen and intended emotion for that channel. Multivariate and subsidiary analyses showed the following:

For tone of voice (vocal channel), discrimination of congruent messages was good and unaffected by anxiety. Discrimination of incongruent messages was poor and unaffected by anxiety. Discrimination of conflicting messages fell from moderate to very low levels as anxiety increased. Hypotheses (1), (2), and (3) were all partially confirmed.

For statements (verbal channel), discrimination of congruent, incongruent, and conflicting messages was good, moderate, and relatively poor, respectively. Discrimination of all messages was unaffected by anxiety. Only hypothesis (2) was confirmed. In both channels, some effects for sex, and interactions with other variables were found.

Results confirming hypotheses were discussed with reference to theory and data in the field. Results inconsistent with hypotheses were explained in terms of factors such as the relaxed experimental atmosphere, credibility of messages, and task simplicity. Implications for pathological development and education were outlined.

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INTRODUCTION

One of the foremost concerns of modern day society is that of anxiety. In fact, anxiety has become a dominant factor in some contemporary theories of personality (Spielberger, 1966). According to Spielberger (1966), anxiety is regarded by some theorists as "a principle causative agent for such diverse behavioral consequences as insomnia, immoral and sinful acts, instances of creative self-expression, debilitating psychological and psychosomatic symptoms, and idiosyncratic mannerisms of endless variety" (p. 4).

The development of the concept of anxiety can be traced back to the classical Greek period and particularly to the Hellenistic era (McReynolds, 1975). According to May (1974), the reason for the general rise of anxiety during the Hellenistic era was due to man's inability to "communicate with his world, with others, and with himself" (p. 291). A more formalized description of anxiety was later advanced by Kierkegaard, who distinguished between two different kinds of anxiety (McReynolds, 1975). The first kind is especially evident in children and is typified by a "need for adventure." The second kind is typically concerned with the choices confronting a person as a function of his responsibilities. However, it was not until the writing of

Freud (1936) that anxiety was conceptualized in a truly psychological framework.

As empirical research examining the relationship between anxiety and behavior increased, Freud's theory of anxiety began to receive considerable attention from the psychological and medical professions. A major consequence of such attention was the modification of Freud's original theory of anxiety by others in the area (Mowrer, 1950; May, 1950; Sullivan, 1953). One contemporary theory, for example, (Spielberger, Lushene, and McAdoo, 1977) has described anxiety as a transitory emotional state or condition characterized by feelings of tension and apprehension. Another theory views anxiety as a catastrophic reaction brought about by an individual's failure to comprehend and cope with his environment (Goldstein, 1939). According to Lazarus (1966), anxiety occurs when an individual appraises a situation as threatening, but is unable to locate the source of the threat. As a result, no clear action is possible.

While anxiety plays a dominant role in man's relationship with his environment, communication also plays an important role. Recall May's (1974) notion that during the Hellenistic era, anxiety occurred as a result of man's inability to communicate with "himself, others, and his world". One cannot fully hope to understand human behavior without some knowledge of how one's feelings and emotions are communicated. According to Reardon (1971), the ability

to appraise what another individual desires, feels, and may do is essential for effective interpersonal relations. The ability to discriminate emotions effectively becomes intrinsic to man's survival in a sometimes hostile and perplexing world. Moreover, it has been suggested that particular behavior disorders may be a result of distortions in the way an individual interprets various environmental and social cues (Bateson, Jackson, Haley, & Weakland 1956; Bugental, Love, Kaswan, & April, 1971).

Since an individual's ability to perceive emotion is essential to any effective interaction with his environment, factors which may influence such ability must be explored. According to Tagiuri (1955), the following are three factors which may influence one's perception of others: (a) attributes of the stimulus person, (b) the nature of the interaction situation, and (c) perceiver characteristics. It is the last factor, in particular, anxiety, with which the present research was concerned.

The aim of the remainder of the Introduction is to discuss issues central to the topic of anxiety and to the perception of emotion. First, a general overview of the concept of anxiety is presented. The nature by which anxiety exerts an influence on behavior is examined by focusing on two theories of anxiety. A Cognitive Social Learning Theory is discussed, and then a Response Competition and Information-processing Capacity Model of anxiety is discussed. Various aspects of anxiety are also examined, with discus-

sion centering on its basic constituents (i.e., antecedents, concomitants, and consequences). The means by which anxiety is assessed in children is presented, followed by a brief summary of some of the research investigating the effects of anxiety on behavior.

Pursuant to the anxiety overview is a general overview concerning speech communication. The various components of speech are discussed, including definitions which are integral to the comprehension of speech communication. Next, research on multichannel communication is presented, followed by that on the relationship between anxiety and the ability to decode emotional messages. A number of variables which influence the communication of emotion are presented next. Finally, the present research problem, hypotheses, and overview of the design are outlined.

Aspects of Anxiety and its Influence on the Behavior of Children and Adults

In order to reconcile some of the differing theories of anxiety, Epstein (1972) identifies three basic anxiety provoking conditions. First, Epstein (1972) uses the term "primary overstimulation" to refer to conditions of arousal caused by the "energetic component of stimulation." According to Freud (1936), pain is a special case of overstimulation as it involves a rapid increase of excitation. A notion basic to "primary overstimulation" is that all

organisms have a biologically determined upper limit of tolerance for intense stimulation (Epstein, 1972). According to Epstein (1972), overstimulation is associated with feelings of being overwhelmed and bombarded with stimulation.

Second, Epstein (1972) refers to "cognitive incongruity" as a another anxiety-provoking condition. Cognitive incongruity is based on the premise that individuals have a need to organize various inputs from their environment into a consistent and integrative, predictive system. When hypotheses considered by the individual are either disconfirmed, or are seen as inconsistent with each other, disturbances and high levels of excitation result (Epstein, 1972). Thus, when reality does not fit the cognitive plan, the behavioral sequence is not able to run its course, and anxiety results. According to theorists such as Goldstein (1939), the major source of anxiety is one's inability to integrate the data of the world into a meaningful schema. According to Epstein, the subjective feeling states associated with cognitive incongruity are confusion, disorganization, and personality disintegration.

The third anxiety-provoking condition referred to by Epstein is that of "response unavailability." Response unavailability is used in a broad sense to cover all conditions in which aroused response tendencies cannot be expressed. Such a condition may arise when: (a) the object producing the arousal is unknown; (b) there is some delay

before a particular response can be made; or (c) there is a conflict between opposing response tendencies. Response unavailability is also produced when the necessary response is not contained in the organism's behavioral repertoire. Response unavailability is central to the theories of Lazarus (1966), and Mandler and Watson (1966). The subjective feeling state associated with response unavailability is helplessness (Epstein, 1972).

From the previous discussion it is obvious that anxiety can be defined in a number of ways. Moreover, "anxiety" has become a catchall category which includes not only disruptive, debilitating effects on behavior but also facilitory effects as well (Izard & Tompkins, 1966). Although Epstein's categories provide some insight into the etiology of anxiety, he fails to acknowledge how debilitating effects may be produced. The question most relevant to the present thesis is, "By what mechanisms or processes does anxiety produce a disruption of behavior?"

In order to answer such a question, the role of attention and information processing is now considered with reference to two theories of anxiety. These theories are being introduced primarily because of their general explanatory value of obvious importance not only for understanding the etiology of behavior disorders, but also for understanding the role of anxiety in children. It should be pointed out, however, that the present research did not constitute an empirical test of either of these two theories.

Basic to these two theories is the notion that anxiety interferes or competes with task-relevant or task-appropriate behavior. Each theory, however, adopts a somewhat different conceptual framework as to the process by which anxiety does so.

The Cognitive Social Learning Interpretation of Anxiety

I.G. Sarason (1975) states that Cognitive Social Learning Theory attempts to explain thought processes and covert problem-solving activities that occur before, during and after overt behavior. He also argues that personality can be viewed in a cognitive perspective. He states that cognitive events "refer to ways in which a person searches the environment for cues, integrates new information with old, and finally makes decisions that eventuate in observable behavior" (p. 28). Cognitive Social Learning Theory conceptualizes anxiety as involving two components, a physiological one related to autonomic reactivity ("emotional"), and the other a cognitive one ("worry"). According to Sarason (1975), the latter component can be readily influenced by modeling. That is, models are able to shape one's views and expectancies concerning oneself and others. He argues that "significant social models provide the observer not only with demonstrations of overt responses, but covert ones by thinking through problems and tactics aloud as well" (p.29).

The cognitive component of anxiety (i.e. worry) has been investigated in a number of testing or evaluative situations (Liebert & Morris, 1967; Mandler & Sarason, 1952; Phillips, Martin, & Meyers, 1972). According to Morris, Brown, and Halbert (1977), worry involves conscious concern about one's performance and its consequences, negative task expectations, and negative self-evaluations. Sarason (1975) views the cognitive element of anxiety as a type of self-preoccupation which is characterized by self-awareness, self-doubt, and self-depreciation. The extent and the type of self-preoccupation tends to influence the degree to which a person is receptive to available stimulus information. In any evaluative or testing situation, the highly anxious individual will become self-preoccupied and attend to irrelevant internal events rather than task-related, relevant cues. That is, the highly anxious individual seems to attend to his own internal cues to a greater extent than relevant environmental cues.

Support for Sarason's theory has been provided by Wine (1971). In a review of the literature with regard to the effects of anxiety on test performance from a selective attention viewpoint, Wine reported that subjects scoring high on test anxiety scales responded with personalized, task-irrelevant responses and poor performance scores. A number of investigators suggest that anxiety competes with relevant external cues, and that this reduces or narrows the individual's attentional field (Morris et al., 1977; Easterbrook,

1959; Lazarus & Averill, 1972), as well as causing focusing problems (Dusek, Mergler, & Kermis, 1967). A highly test anxious individual, for example, will either tend to neglect or misinterpret informational cues that may readily be available to him; or he may experience attentional blocks (Sarason, 1975).

Response Competition and Information-Processing Capacity Model of Anxiety

A second theory of anxiety which also provides some insight into the disruptive effects of anxiety on task performance focuses on the individual's information processing capacity (Hamilton, 1975; Broadbent, 1971). Hamilton states that irrelevant cognitive events, which he terms "anxiety", compete with task-relevant information. Both types of information must be processed, but since the organism's capacity is limited, interference occurs. The final result is a disruption of behavior. More specifically, Hamilton argues the following: Anxiety consists of connotative signals presenting information to an organism's cognitive processing system. The many demonstrated effects of anxiety on perceptual, learning, and thinking processes are a result of the limited capacity of the human information processing apparatus. Hamilton formally defines anxiety as "internally generated cycles of connotative signals elicited by external stimuli, which a central interpreting or appraisal process codes as requiring avoidance, and as indicating physical

danger, injury to self-esteem, rejection and loss of affection in valued social settings as well as any other consequences that a person has learned to be potentially harmful" (p. 50). He suggests that these signals are interpreted as potentially harmful and unpleasant, occurring as a result of exposure to adverse circumstances during early development. More specifically, Hamilton states that anxiety is produced as a result of certain mother-child interactions. Maternal responses which are interpreted by the child as emotionally rejecting, cold, strict, controlling, critical, rigid, and lacking in empathy generate anxiety in the child.

In a similar vein, Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) argue that test anxiety in children occurs as a result of constant, critical evaluations by their parents. Using Hamilton's definition of anxiety, if the internally generated cycles of connotative signals "do not habituate or extinguish over the course of development, a wide range of stimuli may continue to produce unpleasant, aversive threatening signals which can ultimately become over-differentiated and overelaborated". Thus, in a neutral or unstressful situation, such self-generated signals become irrelevant. As the number of self-generated signals increases (i.e. anxiety), the total amount of information which must be processed also increases. Since there is a limited capacity as to the amount of information which may simultaneously be processed (Broadbent, 1971), the competing

relevant-irrelevant information produces an interfering, disruptive effect on behavior.

Now that a general overview of anxiety and anxiety theory has been presented, a more detailed discussion of anxiety is warranted. Anxiety is discussed under the following five categories: (a) basic constituents, (b) multidimensionality (c) measurement, (d) effects on various behaviors, and (e) relationship to subsidiary variables.

Some Basic Constituents of Anxiety

According to Phillips, Martin, and Meyers (1972), anxiety can be divided into three basic constituents, namely, antecedents, concomitants, and consequences. Antecedents and consequences can be further conceptualized on two levels, proximal and distal. Let us consider each of these constituents.

Proximal antecedents of anxiety are those which are immediately and directly responsible for anxiety reactions. For example, some proximal environmental antecedents are: (a) ambiguity concerning the nature of the threat, (b) situational constraints, including probable reactions to the environment, and (c) the availability of increased personal contacts which enhance the possibility of mobilization of resources. Some proximal antecedents of anxiety related to individuals are: (a) degree of felt uncertainty in coping

with the threat, (b) conflicts engendered in the situation, and (c) the degree of intolerance of ambiguity.

Distal antecedents of anxiety are those which contribute indirectly to anxiety reactions such as responses to stress conditions, and the threat which is perceived in relation to these conditions (Phillips et al., 1972). Some distal antecedents of anxiety are: (a) negative preschool and early school experiences, and (b) specific aspects of the parent-child relationship. The following two hypotheses have been proposed by Sarason et al. (1960) with regard to parent-child relationships: (1) The child suffers persistent and critical evaluations by his or her parents, producing within him a sense of hostility. (2) Such hostility, coupled with parental misperception or mishandling of the situation, produces a conflict situation ultimately leading to a break (i.e., impairment) in their communication.

According to Phillips et al. (1972), the major concomitants of anxiety fall into two primary classes of variables. One class includes the phenomenological, physiological, and behavioral factors which may be closely associated with anxiety (i.e., the actual indicators of anxiety). Factors which are included in the first class are fear, guilt, emotional instability, blood pressure, facial expression, and speech difficulties. The second class of concomitants includes factors intimately associated with anxiety, but not typically considered part of anxiety. Such factors are

defensive tendencies, acquiescence, cognitive avoidance, and preoccupation with demands of self rather than situational or task demands.

A final constituent of anxiety is that related to outcomes or consequences. As was the case with the antecedents of anxiety, consequences are also categorized into proximal and distal levels. Proximal consequences are those which are directly associated with anxiety and its concomitants (Phillips et al., 1972). Examples of proximal consequences are: (a) reduced responsiveness to the environment, (b) interference with a variety of cognitive and mediational process, and (c) increased drive or motivational level. It is also apparent that children who differ in their assessed level of anxiety vary not only in their attentiveness to environmental stimuli, but also in their interpretation and use of cues in problem solving (Sarason, 1966; Sarason, 1975; Easterbrook, 1959).

Distal consequences may best be described as consequences of consequences, and usually depend on the interaction between the consequences of anxiety with situational demands. According to Phillips et al. (1972), some examples of distal consequences are: (a) deterioration in complex intellectual problem solving, achievement, and learning activities, (b) increased susceptibility to persuasion and the behavior of models, and (c) increased isolation from others, coupled with heightened affiliation needs.

Anxiety as a Two-Dimensional Variable

The above discussion indicates that there is more than one antecedent and consequence of anxiety. The present discussion is concerned with the notion that anxiety itself may take more than one form.

Data on the effects of anxiety on behavior are somewhat inconsistent. Some studies report facilitative effects of anxiety, but the majority report disruptive and debilitating effects. In order to understand such inconsistencies, Spielberger (1966, 1972) and Izard (1972) argue that investigators should distinguish between different forms of anxiety. More specifically, they argue that research must distinguish between state anxiety and trait anxiety. Johnson (1968) and Johnson and Spielberger (1968), for example, have shown that tests of state anxiety seem to measure a different type of anxiety than do tests of trait anxiety. Moreover, Cattell (1966) and Cattell and Scheier (1958, 1961) have demonstrated that certain factors which comprise state anxiety are different from those which describe trait anxiety. Let us consider this distinction in more detail.

The term state anxiety is typically applied when referring to emotional reactions that are "evoked in individuals who interpret specific situations as personally threatening" (Spielberger, 1972, p. 30). It is a transitory emotional condition that may vary and fluctuate over time. Corre-

sponding to state anxiety are feelings of apprehension, tension, and heightened activity of the autonomic nervous system.

Trait anxiety has been defined as relatively stable individual differences in anxiety-proneness (Spielberger, 1966). In other words, anxiety as a personality trait implies an acquired predisposition to perceive a variety of objectively nondangerous circumstances as threatening. According to Endler (1975), those individuals classified as "trait anxious" personalities are "self-deprecatory" and concerned with "fear of failure"(p.149). Cattell (1961) suggests that there are further component characteristics of trait anxiety such as "guilt proneness," "suspiciousness", and a "tendency toward embarrassment" (pp. 57 & 182). Similarly, Schalling (1977) argues that anxiety-prone individuals (i.e., those exhibiting trait anxiety) overreact emotionally, and are more sensitive to stressful stimuli than less anxiety-prone individuals. She states that these subjects have a slower rate of habituation of psychophysiological responses to simple stimuli, and have more difficulty relaxing after stimulation.

Some support for such a notion has been provided by Malmo (1957). He found that irrespective of stress conditions, patient groups characterized by high levels of chronic anxiety showed greater reactivity and wider variability than normals on many different physiological and behavioral measures.

Trait factors are presumably influenced by such variables as the biological and constitutional make up of the individual, as well as childhood experiences (Spielberger, 1966). Specifically, Spielberger argues that childhood experiences centering around punishment is implicated in the development of trait anxiety. In a similar vein, Sarason et al. (1960) argue that critical evaluations by parents are the crucial variables in the development of childhood anxiety. Some support for Sarason's notion has been demonstrated by Katz (1967), who found that fathers of high anxious children were more harsh in their judgements of their children than fathers of low anxious children.

Since trait anxiety is the major variable of concern in the present research, some discussion as to the rationale for its choice over state anxiety seems warranted. According to Stagner (1976), traits are valuable constructs for explaining behavior, and are more powerful in predicting behavior than are situational determinants. The consistency of trait measures over time has been demonstrated by such investigators as Block (1971), Robins (1966), and Harrell (1972). Block (1971), for example, demonstrated that traits identified in childhood had predictive value for the same individuals ten to twenty years later. Similarly, Robins (1966) found that a combination of aggressive symptoms in childhood gave a better prediction of adult criminality than could be obtained from any single aggressive or delinquent

act. Stagner (1976) states further that traits, once established, "will determine what situations the person will approach, what inputs he will perceive as reinforcing (and which ones he will ignore or reject), and what responses will be emitted in response to experimental instructions or situational pressures" (p. 118). Therefore, it would seem important as well as interesting to investigate the effects of a consistent personality variable, such as trait anxiety, rather than another less predictive, transient situational form.

Measurement of Anxiety in Children

Let us now consider the measurement of anxiety in children. The measurement of children's anxiety seemed to receive little or no empirical attention until the latter part of the 1950s. However, with the modification of the Taylor Manifest Anxiety Scale (Taylor, 1953) for use with children, an impetus for research was generated. As a result, a number of anxiety scales specifically devised for children appeared (Casteneda, McCandless, & Palermo, 1956a; Sarason et al., 1960; Spielberger, Edwards, Lushene, Monturi, & Platzek, 1972; Reynolds & Richmond, 1978). It will be useful at this point to discuss three scales frequently used by investigators in order to provide an overview of anxiety measurement. Also discussed are details of the rationale for the scale used in the present research.

Test Anxiety Scale for Children (TASC) and General Anxiety Scale for Children (GASC). The Test Anxiety Scale for Children (TASC) is specifically designed to assess anxiety in a "test-like" or evaluative situation. (Sarason et al., 1960). The TASC can typically be given in conjunction with another anxiety scale which is designed to measure an individual's general level of anxiety. The General Anxiety Scale for Children (GASC) is comprised of 45 anxiety items including a lie scale, whereas the TASC contains 30 items and no lie scale. Typically, all questions are read to the subjects who respond by choosing a "yes" or "no" response on the answer sheet. A high percentage of "yes" responses on the TASC or GASC denotes a high degree of anxiety.

Children's Manifest Anxiety Scale (CMAS). The CMAS is a modified version of an earlier scale initially designed to investigate anxiety as a drive or motivational state (Taylor, 1953). The original Taylor Manifest Anxiety Scale consisted of 60 items selected from the Minnesota Multiphasic Personality Inventory. The modified children's version consists of 42 anxiety items with an additional 11 items introduced to provide an index of defensiveness, that is, the subject's tendency to falsify responses (Casteneda, McCandless, & Palermo, 1956a).

The CMAS has been widely used to assess the effects of trait anxiety on such variables as task performance (Casteneda, Palermo, & McCandless, 1956b; Palermo,

Casteneda, & McCandless, 1956), popularity (McCandless, Casteneda, & Palermo, 1956), perception of word phrases (Titsworth & Amble, 1973), reading ability (Merryman, 1974), and perceptual rigidity and closure (Smock, 1958). Cross-cultural differences in anxiety have also been investigated using the CMAS (Chiu, 1971; Ziv & Shauber, 1969).

Research utilizing the CMAS has yielded test-retest reliabilities at about .90 for the anxiety scale, and .70 for the lie or defensiveness scale (Casteneda et al., 1956a). Bledsoe (1975) also demonstrated the construct validity of the CMAS across populations of school children. Six hundred and eleven pupils in grades four through seven from two suburban schools served as subjects. The 53 individual response items of the 611 pupils were factor analyzed. Such a procedure yielded two separate factors. Factor 1 consisted of the 42 items identified as the anxiety scale, while factor 2 consisted of the 11 items originally identified as the lie scale.

What I Think and Feel (WITF). In reviewing a number of anxiety scales, Zuckerman and Spielberger (1976) concluded that the CMAS is a reliable measure of trait anxiety. However, a third scale used to assess trait anxiety--one that seems even more useful and was of central concern in the present research--is the revised form of the Children's Manifest Anxiety Scale labelled, "What I Think and Feel" (Reynolds & Richmond, 1978).

In constructing the WITF, a panel of experienced teachers and clinicians reviewed the 43 anxiety items and 11 lie scale items included in the CMAS. To counter a criticism by teachers who indicated that most tests of anxiety do not poll enough areas of anxiety in children, the reviewers were asked to suggest anxiety items not contained in the original test. As a result, 20 additional items were included in the revised test. The 73 item test was then reviewed by reading specialists in order to reduce problems associated with word comprehension. The reading level was subsequently set at the third grade level, which meant that the average third grade student could complete the test alone. The test was administered to a sample of 329 urban black and white school aged children randomly selected from grades one through twelve inclusive.

In order to counter a criticism by Flanigan, Peters, and Conry (1969)--that a number of test items on the original CMAS did not meet the criteria for a good test item--the following two item statistics were computed for each of the 73 test items: (a) the difficulty index, and (b) the biserial correlation of the items to the total test score. The difficulty index is a statistic used to determine the average difficulty of each item. According to Flanigan et al. (1969) a "good" test should contain items of 50 percent difficulty when corrected for chance. The adoption of such a procedure, they argue, would discriminate among members of a

particular group more accurately. In the case of anxiety tests, for example, an item missed by everyone, or one answered correctly by everyone would be of no value in differentiating between high and low anxiety levels. The second statistic calculated, namely, the biserial correlation of the test items, yielded a reliability estimate of $+0.83$ (Reynolds & Richmond, 1978). A total of 28 anxiety items and 9 lie scale items were retained after these two statistics were computed. (Out of these 28 anxiety items 25 were retained from the original CMAS.) Two lie scale items were deleted as they failed to correlate significantly with other lie items. The anxiety scores of the initial sample were also submitted to an analysis of variance with sex of subject, race, and grade level as the independent variables. Only sex of subject reached significance, indicating that females were more anxious than males. These same investigators administered the WITF to a second sample consisting of 167 students in grades 2, 5, 9, 10, and 11. A correlation of $+0.85$ was obtained between the original sample and this second or cross-validation group.

The construct validity of the WITF was also determined by a factor analytic procedure using the original 329 subjects (Reynolds & Richmond, 1979). Support for the construct validity of the WITF would be demonstrated if three factors emerged which were consistent with previous research also reporting three factors (Finch et al., 1974). The re-

sults indicated that the anxiety items could indeed be separated into three distinct factors. The first factor corresponded to a physiological manifestation of anxiety, the second, to a worry and oversensitivity factor, and the third, to a fear and difficulty of concentration factor. Recall that these factors are identical to those identified by Finch et al. (1974) in the analysis of the original CMAS. Reynolds and Richmond (1979) also indicated that of the 15 anxiety items loading on the three factors found by Finch et al. (1974), 11 items were from the original CMAS, and retained in its revised form, the WITF.

In order to assess the validity of the WITF further, Reynolds (1980) administered the WITF along with the State-Trait Anxiety Inventory for Children (Spielberger et al., 1972) to a group of 42 children referred for psychological evaluation. Support for the validity of the WITF would be demonstrated if a large correlation occurred between the WITF and the State-Trait Anxiety Inventory for Children-Trait Scale, with little or no correlation between the WITF and the STAIC-State Scale. Reynolds found a highly significant correlation of $+ .85$ between the WITF and the STAIC-Trait Scale, and a nonsignificant correlation of $+ .24$ between the WITF and the STAIC-State Scale. Although Reynolds and Richmond (1979) have systematically investigated the utility of the WITF as a measure of anxiety in children, they acknowledge that evidence of "direct" validity of the

WITF is lacking. They do, however, report three interesting results bearing on the validity issue: (a) Twenty-five of the 28 anxiety items found on the WITF were retained from the original CMAS. (b) Females displayed a greater degree of anxiety than males--a finding consistent with previous research employing the original scale (Casteneda et al., 1956a), as well as other anxiety scales (Sarason et al., 1960). (c) There was a consistent age trend (Angelino et al., 1956). These results, the authors suggest, are further indications of the validity of the WITF.

Methodologically, the relative merit of the WITF as compared to the original CMAS is also evident. First, the WITF includes a number of new anxiety items which poll a larger number of anxiety responses in children. Second, the elimination of possible comprehension problems by reading specialists increases its utility with populations such as very young children, slow learners, and the mentally retarded. Third, the revised test shows excellent inter-item and cross-validation reliability. Fourth, the WITF shows excellent construct validity. Fifth, the WITF represents a 33% reduction in item length as compared to the CMAS, and thus provides greater facility in administration and scoring. It seems clear, then, that the best measure of trait anxiety to use in any investigation with children would be the WITF scale.

In any discussion of anxiety, one cannot ignore the fact that some children may not respond to the test questions in a candid manner. It is for such a reason that the three anxiety scales previously discussed include a lie or defensiveness scale. In an investigation of the relationship between anxiety and defensiveness, Baldry and Sarason (1968) reported that highly anxious college students in a stress condition presented a better adjusted picture of themselves on a social desirability scale and personality inventory than they did under neutral conditions. A similar result was also reported for children by Lunneborg (1964).

A number of investigators have reported a consistent negative relationship between test anxiety in children, measured by the TASC, and defensiveness, measured by the Lie Scale for Children (LSC) (e.g. Hill & Eaton, 1977; Sarason et al., 1960). Such investigators argue that defensiveness may affect TASC scores because children seek to present themselves in a most favorable way, and therefore distort their responses on the anxiety scale.

In order to demonstrate whether defensiveness may have a causal impact on anxiety, or whether anxiety may have a causal impact on defensiveness, Eaton (1980) employed a cross-lagged panel design using the combined anxiety scores and LSC scores for three groups of subjects. Data from children in the first group were obtained from a previous study by Hill and Sarason (1966). Children in the first

group were initially tested in 1960 when they were in grades three and four and retested in 1962. The second group included children in grades three, four, and five who were tested by Eaton in 1975, and retested in 1976. The final group of children, also tested by Eaton, were in grades one through five, initially tested in 1974, and retested in 1975. It was found that the cross-lagged correlations were significantly different. The LSC1-TASC2 correlation was significantly larger than the TASC1-LSC2 correlation. Eaton concluded that defensiveness had a stronger influence on subsequent test anxiety than anxiety had on subsequent defensiveness.

It is interesting to note that the relationship between anxiety and defensiveness is not entirely clear if a trait measure of anxiety (CMAS) is employed. For example, while Casteneda et al. (1956a) reported a low insignificant correlation between the CMAS anxiety items and the lie scale, Sarason et al. (1960), using the same scale, reported a high, statistically significant correlation between the two. Since the relationship between defensiveness and trait anxiety as measured by the CMAS is not entirely clear, in any research examining the relationship between trait anxiety and behavior, defensiveness should be measured, and consideration given to the necessity of partialing out its effects.

The following and final section on anxiety concerns the effects of anxiety on a number of dependent variables. Specifically, anxiety is discussed with respect to task performance, achievement, social behavior, age, intelligence, and sex of subject. The purposes of this discussion are to acquaint the reader with important data in the area, and to highlight the important variables that were controlled or studied in the present research.

Effects of Anxiety on Task Performance, Achievement, and Social Behaviors

As noted before, while some studies have shown that anxiety has positive effects on performance, the bulk have shown that it has negative effects. Facilitative effects of anxiety, for example, have been reported for only a small number of tasks, such as locating embedded figures in a complex drawing (Ruebush, 1960; Witkin, Lewis, Hertzman, Machover, Meissner & Wafner, 1954). The majority of investigators have typically reported negative or disruptive effects of anxiety on tasks such as paired associate learning (Stevenson & Odom, 1956; Goulet & Mazzei, 1969; Verma & Nijhawan, 1976), free recall (Mueller, 1976), short term memory (Hodges & Spielberger, 1969), problem solving (Sarason, Davidson, Lighthall, and Waite, 1958), and reading ability (Merryman, 1974). It should be pointed out that the debilitating effects of anxiety have been demonstrated using a variety of anxiety measures. For example, Merryman (1974) investigated

the effects of trait anxiety on reading ability. The CMAS was administered to a group of 180 fifth grade students who were then given tests of comprehension and vocabulary. It was found that moderate and low anxiety groups did significantly better than high anxiety groups on both tests of comprehension and vocabulary.

In a similar vein, Nottelman and Hill (1977) investigated the effects of anxiety on performance and off-task behavior. Fourth and fifth grade children were initially administered the TASC and, on the basis of their obtained scores, were assigned to either high, medium, or low anxious groups. All subjects were then given a number of anagram tasks to complete. It was found that the highly anxious group had the lowest performance scores, and exhibited more off-task glancing than did the low or moderately anxious groups.

A negative relationship has also been reported between anxiety and school achievement. McCandless & Casteneda, (1956) found that of 30 computed correlations between anxiety scores and various achievement areas, only one was of zero magnitude, and only one other was positively correlated and significant at the .05 level. Thirteen out of the remaining 28 correlations were negative and statistically significant.

Another study compared underachieving boys with overachieving boys (Kimball, 1953). One group consisted of boys with high IQs and low grades (underachievers); a second consisted of boys with high IQs and high grades (control group); a third group included boys with low IQs and high grades (overachievers); and the fourth group included boys with low IQs and low grades (control group). All subjects in the four groups were also compared with a randomly selected group of 100 boys from the same school. The results indicated that overachievers showed a greater amount of anxiety than did the controls, as measured by the Rorschach test. The level of anxiety of the underachievers did not differ from that of the normal achievers.

Anxiety is also negatively correlated with various social behaviors (Sarason et al., 1960). For example, Doris (1959), employing a sample of fifth and sixth grade children, found that those children who were identified as highly anxious on the TASC were self-deprecating, and tended to blame themselves and others for their personal failures. Highly anxious children have also been shown to be more dependent than low anxious children (Sarason, 1958). A significant positive relationship has also been reported between school anxiety and hostile and aggressive behavior in children (Phillips, Adams, Getts, & McNeil 1969, cited in Phillips et al., 1972). Moreover, a higher incidence of maladaptive behavior in anxious boys has also been reported (Fischer, 1969, cited in Phillips et al., 1972).

The studies discussed above indicate overall that anxiety can disrupt or interfere with behavior in a number of domains, including performance on various tasks, achievement, and social functioning. They therefore attest to the general validity of anxiety theory, and suggest that anxiety would have a negative effect on the perception of emotion.

The Relationship Between Anxiety and Subsidiary Variables

A number of variables extraneous to those of immediate interest may interact with anxiety and influence results. It will be useful at this point to examine how these variables--chronological age, intelligence, and sex of subject--might affect results, and what could be done to deal with them.

Chronological Age. While some of the results with respect to the relationship between anxiety and age are conflicting, a definite pattern does emerge. Some researchers investigating the relationship between anxiety and chronological age in children have reported that anxiety increases between the ages of 6 and 12 years (Thompson, 1965; Sarason, 1959). Other investigators employing subjects between the ages of 12 to 14 have found no significant relationship between anxiety and age (Nijhawan, 1972). A study which might provide an explanation for such results was undertaken by Angelino, Dollin, and Mech (1956). They reported that in a sample of children ranging in age from 9 to 18 years, fear

and worry pertaining to school showed a general increase from 9 to 12 years followed by a slight and even decline up to 18 years of age.

Some conflicting results have been reported with regard to the relationship between anxiety and grade level. While Casteneda et al. (1956a) reported no significant relationship between anxiety and boys and girls in grades 4, 5, and 6, Bledsoe (1973) found that fourth grade girls and sixth grade boys were more anxious than fourth grade boys and sixth grade girls. In a similar vein, Manley and Rosemier (1972) examined the developmental trends in general anxiety as well as test anxiety among junior and senior high school students (grades 7 through 12 inclusive). While a significant relationship was found between grade level and "test anxiety", no significant relationship was found between grade level and "general anxiety". While they reported a consistent decline in test anxiety for both boys and girls, the girls did not exhibit a similar pattern of decline as the boys. While the boys exhibited a steady pattern of decline from the seventh to twelfth grades, the girls exhibited a more uneven decline. According to Manley and Rosemier (1972) "significant drops in test anxiety for girls were noted between grade 8 and 9 and between 10 and 11 with an intermediate resurgence between grades 9 and 10" (p. 224). In overview, the data suggest that anxiety increases from 6 to 12 years of age. After 12 years, anxiety level seems to remain constant or declines slightly.

Since there is a positive relationship between anxiety and age or grade level, it seems necessary that research in the area should pay attention to the grade level of the subject. This could be done either by including age in the design, or more simply, by focusing on an age level for which anxiety effects would most likely be found.

Intelligence. Data regarding the effects of anxiety on intelligence are equivocal. Although some studies report no significant relationship between anxiety and intelligence (Trent, 1957; McCandless & Casteneda 1956; Merryman, 1974), others report a significant negative relationship between the two (Sarason et al., 1960; Kerrick, 1956). As well, a number of investigators have reported an interaction between anxiety and intelligence, with anxiety facilitating performance at upper levels of intelligence, but disrupting performance at lower levels (Spielberger, 1966; Denny, 1966; Verma & Nijhawan, 1976). Since there seems to be some relationship between anxiety and intelligence, albeit a complex one, research in the area should take intelligence into consideration by measuring it, and considering the need to partial it out.

Sex of Subject. Investigators using a variety of anxiety measures have typically reported a positive relationship between anxiety and sex. That is, in the majority of studies, females typically have obtained higher anxiety scores than males (Sarason et al., 1960; Casteneda et al., 1956a;

Maccoby & Jacklin, 1974; Manley & Rosemier, 1972; Reynolds & Richmond, 1978; Douglas & Rice, 1979; Nijhawan, 1972). One interpretation for the higher anxiety level in females is that they find it easier to express anxiety as it is a reflection of their femininity (Sarason et al., 1960). Whatever the cause, it seems clear that research should include sex of subject as a factor in the design.

Perception of Emotion and its Role in the Behavior of Children and Adults

According to Reardon (1971), man's ability to appraise what another individual desires, feels, and may do is essential for effective interpersonal relations. In other words, an individual must be able to perceive the emotions of those around him in order that he may respond appropriately. Emotions may be communicated via a person's facial features (Buck, 1975; Izard, 1971; Levitt, 1964), his body motion (Fast, 1970; Dittman, 1978), and his speech or voice (Dittman, 1972). The impetus for the experimental examination of the perception of emotion comes from such fields as clinical psychology, where abnormal communication patterns have long been considered indicative of behavior disorders (Bateson, Jackson, Haley, & Weakland, 1956; Bugental, Love, Kaswan, & April, 1971).

Before aspects of the perception of emotion are discussed further, definitions of components of speech communication are warranted. Soskin (1953) has suggested that

voice messages can be conceptualized into two distinct channels, the verbal and the vocal. The verbal channel is responsible for the transmission of various aspects of speech such as words and phrases which define the semantic message (i.e., content of speech). The vocal channel is responsible for the transmission of various aspects of speech which convey such information as voice quality, intonation, and rhythm, and seems to have a greater impact on affective communication than does the verbal channel.

When stimuli are simultaneously presented to two channels, a "multiple message" is produced (Mehrabian & Wiener, 1967). In the case of the present research, the two channels of interest were the verbal and the vocal speech channels (Reference is made to other communication channels such as the visual channel and the body channel, where appropriate.) Multiple emotional messages are categorized here as either congruent, incongruent, or conflicting. A "congruent" message occurs when emotional messages presented to both channels are the same. For example, a happy verbal statement which is conveyed in a happy vocal tone of voice is considered congruent. An "incongruent" message occurs when the emotional message presented in the two channels are dissimilar but not opposite. For example, when a happy statement is said in a neutral or loving tone of voice, the message is incongruent. A "conflicting" message is defined as one which conveys an opposite meaning in the two channels.

For example, a happy statement communicated in a sad tone of voice constitutes a conflicting message.

Two further concepts which need to be defined in relation to speech communication are the encoding and decoding ability of individuals. Encoding is defined as the ability of an individual to transmit cues which can be effectively discriminated by others, while decoding is defined as the ability to interpret or discriminate among these cues (Zuckerman, Lipets, Koivumaki & Rosenthal, 1975; Zaidel & Mehrabian, 1969). To date, a vast body of literature has accumulated on the encoding and decoding of emotional messages via the vocal channel (e.g., Davitz & Davitz, 1959; Starkweather, 1956a, 1956b; Soskin & Kauffman, 1961; Zuckerman, Lipets, Koivumaki & Rosenthal, 1975; Mehrabian & Ferris, 1967). For a review of the topic, see Butchard (1983). Procedures and results of such studies are outlined below where appropriate.

It should be pointed out here that studies investigating the perception of emotion in speech have typically focused on the vocal channel only. Emotional content presented via the verbal channel has been held constant. A number of different techniques have been employed in order to negate the emotional messages presented through the verbal channel. The most typical methods have been: (a) the use of a constant, ambiguous set of words (e.g., Fairbanks, 1940), (b) the use of electronic filtering (e.g., Soskin &

Kauffman, 1961; Starkweather, 1956a, 1956b), and (c) the use of a language foreign to the listener (e.g., Kramer, 1964). Again, for a review, see Butchard (1983). Usually, it may be noted here, such experiments have indicated that subjects are capable of discriminating the emotion carried solely by tone of voice. However, since the majority of studies designed to investigate the perception of emotion in speech have typically focused on one channel only, it is still unclear how simultaneous, multichannel communication may affect children.

An examination of the effects of multiple emotional messages on behavior in children is clearly important. It may provide some insight into maladaptive and abnormal behavior (Bateson et al., 1956; Weakland, 1960; Beakel & Mehrabian, 1969). To date, much of the theoretical speculation concerning the relationship between the ability to decode multiple emotional messages and abnormal behavior such as schizophrenia has focused on adults. If one could extrapolate this theory to include children, the importance of such research becomes relevant from a developmental perspective. Moreover, previous research in the area has provided only minimal consideration of the importance of specific personality variables such as trait anxiety in the decoding of multiple emotional messages.

The point is, then, that it would be useful to examine the role of anxiety in childrens' ability to discriminate multiple emotional messages in order to provide needed in-

formation in the area, and thus possibly provide some insight into the relationships among personality, communication, and pathology. To elaborate on this point--which formed the basis for the present research--let us now consider research on multichannel communication, the relationship between perception of emotion and anxiety level, and other variables of interest.

Research on Multichannel Communication

Studies of multichannel communication have employed diverse methodologies, and yielded a variety of effects. Olsen (1967) for example, presented children with 22 incongruent and 8 congruent messages. The children were asked to describe what each speaker was feeling and what he was attempting to convey to the subject. He found that children responded to the verbal channel of a multiple emotional message and discounted the vocal channel.

Koburger (1977) investigated the encoding and decoding skills of children by having them carry out three tasks. In task one, each child encoded friendly, neutral, and unfriendly single channel messages in the facial and vocal channels. In task two, they decoded friendly, neutral, and unfriendly single channel messages in the facial and vocal channels produced by two adult males. In task three, they were asked to decode two types of inconsistent emotional scenes. The first consisted of either a friendly face,

neutral statement, and unfriendly voice; and the second, unfriendly face, neutral statement, and friendly voice. It was found that children decoded inconsistent messages according to the visual channel, and disregarded the vocal channel.

Mehrabian and Wiener (1967) investigating inconsistent multiple messages transmitted via the verbal and the vocal channels, combined three levels of message content, namely, positive, neutral, and negative with three levels of tone of voice, namely, positive, neutral, and negative. Except for the positive content - positive affect, neutral content - neutral affect, and negative content - negative affect conditions, all other conditions were inconsistent (i.e. incongruent or conflicting). Initially in their study, a number of words was rated on a scale from -6 (most negative) to +6 (most positive) by one sample of undergraduate students. As a result of the procedure, a total of 9 stimulus words were selected (3 positive, 3 neutral, and 3 negative). Two female speakers then tape recorded each of the 9 words in either a positive, neutral, or negative tone of voice, yielding a total of 54 stimuli. Subjects in a second sample of undergraduates were divided into three groups, and presented with the stimuli. They were instructed to attend either to the content of the messages, or to the tone of voice, or to a combination of the content and tone of voice of the messages. The subjects were told to imagine each of

the words as being said by the speaker to another person, and were then asked to judge the speaker's attitude toward that person. The subjects were to rate the speaker's attitude toward the second person on a scale from -3 (negative) to +3 (positive) for each message. It was found that a positive or negative tone caused subjects to rate the message as positive or negative respectively, when the subjects were instructed to listen to tone. A similar effect occurred for content when the subjects were instructed to listen to the content only. However, the vocal channel had a greater impact on the subjects' interpretation of the total message than did the verbal channel. That is, when subjects were asked to listen both to the content of the message and to the tone of voice, significant results were found for tone of voice. No significant results were found for content of message under this condition.

Mehrabian and Ferris (1967) used a similar design to that of Mehrabian and Wiener (1967) to examine the effects of nonverbal communication on subjects' ability to infer the attitudes of a speaker. Facial stimuli consisting of photographs and recorded vocal stimuli were prejudged as negative, neutral, or positive. Twenty female undergraduate students then rated the combined facial-vocal stimuli. Mehrabian and Ferris found that both the facial and vocal emotional information affected the subjects' ability to infer attitudes about the speaker. They showed that the fa-

cial and vocal information did not interact, but rather, that the facial component had a stronger effect than the vocal component. The information presented by the facial and the vocal channels combined in a linear function with the facial component receiving approximately $3/2$ the weight received by the vocal component. The results partially support their previous findings (Mehrabian & Wiener, 1967) indicating the importance of the vocal channel in communication.

In a similar vein, Bugental, Kaswan, and Love (1970a) investigated the effects of conflicting messages in the visual, vocal, and verbal channels in children and adults. A set of videotaped messages was produced by male and female actors (graduate students and professors within the Department of Psychology). The messages contained conflicting inputs (friendly or unfriendly) in the verbal, vocal, and visual channels. There were 4 messages which represented each channel combination for a total of 32 stimuli. A group of children aged 5 to 12 years and their parents were included as subjects in the study. Each subject saw and rated 4 messages representing one combination of channel inputs, (e.g. positive verbal, negative vocal, and negative visual). A significant decoder age difference was found with one type of message only. That is, a message in which the female speaker smiled but made critical statements in a negative tone of voice (a type of joking) was rated as more negative

by children than by adults. A further result was that messages were rated as negative if either the verbal or the vocal component was negative. Thus, a positive input in one auditory channel was discounted if the other channel was negative. For example, if a joking type of message which was negative in both the verbal and the vocal channels but positive in the visual channel (smiling) was compared with a sarcastic type of message which was negative in one channel only (voice), no difference in the ratings of these types of messages was observed. The investigators also reported that in general, the facial expression of the speaker carried more weight in the resolution of conflicting messages than the auditory channels. In a second study, Bugental et al. (1970b) found that for young children as compared to adults, the visual channel had less impact on their ability to decode multiple emotional messages than the vocal or verbal channels. This effect was significant only for perception of women's smiles.

In order to examine the effects of the inconsistency between verbal and vocal channels as a function of potential credibility cues of the two channels further, Bugental (1974) employed spontaneous messages rather than "acted" messages. She argued that the weight assigned to vocal intonation would be greater the more natural or sincere the voice. Moreover, the weight assigned to content would be greater the more evaluatively moderate (as opposed to ex-

treme) the content was. The messages were comprised of natural conversational units between a group of mothers and their "disturbed" children, and a second group of mothers who interacted with their "normal" children. The children were all of elementary school age. The messages were drawn from an existing library of videotaped family interactions, and preselected by the investigator as being either evaluatively positive or negative in verbal content, and positive or negative in intonation. The messages contained high or low potential credibility cues within the verbal channel, as well as high or low potential credibility cues within the vocal channel. Potential content credibility cues within the verbal channel were defined on the basis of evaluative extremeness, as rated by a group of undergraduate students. Potential credibility cues for intonation were defined by the congruence between the speaker's intonation and facial expression, also as rated by undergraduate students. It should be noted that the judges rating the final speech stimuli did not see facial expressions as they were used only as a voice-credibility index.

Several results are worth noting. Voice spontaneity or naturalness of delivery was significantly related to voice credibility. In other words, spontaneous voices were described as more credible. It was found that intonation received greater weight if there were high cues to credibility within the vocal channel. That is, "if the speaker had an

unpolished, spontaneous delivery the approval or disapproval within the voice is believed no matter what the individual is saying" (Bugental, 1974, pp. 130-131). Bugental referred to this process as "channel discounting". Her results showed that if the intonation was convincing, the content was disregarded. However, when the intonation was not convincing, the two channels interacted and the subjects disregarded either the positive or negative implications of the message. Bugental (1974) referred to such an effect as a "univalent-discounting process."

A number of studies have indicated that the dominance of particular channels over others is dependent upon the type of emotional dimension being conveyed. Mehrabian (1970) examined the circumstances under which positive and negative inconsistent communications were preferred over positive and negative consistent communications. He began by rating sentences as positive to negative on a +3 to -3 scale. These statements were then recorded with intonations varying from strongly negative to strongly positive. In four experiments he had subjects imagine that they were communicating these messages to another person. They also imagined that these conversations occurred in varying social situations which varied in formality. For example, one group of social situations was as follows: (1) liking of the addressee, (2) degree of conflict and irritation between the communicator and the addressee, and (3) the pleasantness of the addressee's behavior toward the communicator. He found

that in all situations subjects preferred consistent messages over inconsistent messages. The subjects also showed a preference for negative inconsistent messages (negative vocal-positive verbal components) as compared to positive inconsistent messages (positive vocal-negative verbal components). According to Mehrabian(1970), the verbal component of an inconsistent message conveys "evaluative attitudes toward the actions of the addressee" while the vocal component conveys "evaluative attitudes toward the person of the speaker". Generally, if the subject is asked to determine how a speaker feels personally about the subject, a greater reliance is placed on the vocal information rather than the verbal information.

In a similar vein, LoCastro (1972) found that particular channels of communication were more sensitive to certain emotions than others. For example, he found that the verbal and the vocal channels, as opposed to the facial channel, were more influential in determining a person's choice of an emotional message when emotional messages such as anger and love were conveyed. He also found that the vocal and the facial channels were more influential than the verbal channel in a person's choice of a message when emotions such as sadness and joy were conveyed.

The effects of content and intonation on perception of verbal evaluative feedback was investigated by Solomon and Yaeger (1969a). College students heard a number of taped

evaluations (i.e., "reinforcers") representing three levels of content (positive, neutral, and negative) and three levels of intonation (pleased, indifferent, and displeased). All subjects rated each reinforcer on three 5-point scales, with each scale ranging from very negative to very positive. The subjects rated each reinforcer with respect to its meaning concerning (a) the adequacy of the performance of the child, (b) the feelings of the child, and (c) the speaker's feelings toward the child. It was found that the content of the reinforcer was more influential in judgements of "objective" meaning (i.e., performance), and only moderately influential for judgements about the recipient's feelings. Intonation, however, carried more weight when judgements about the speaker's liking for the recipient was concerned.

The above studies show that messages presented in different channels can influence subjects' behavior in more than one way, depending on such factors as the negativity and credibility of vocal or verbal messages. One reasonably consistent finding seems to emerge, however: when a multiple message is presented to subjects, they tend to focus on one channel, and to disregard another. This finding suggests that the presence of information in one channel may interfere with the ability to process information in another. Thus, having a different emotional message in one channel may detract from the accuracy with which a message is discriminated in another channel.

A similar interpretation of the available data was offered by Butchard (1983). On the basis of his interpretation of the data, Butchard hypothesized that discrimination of multiple emotional messages in the vocal and verbal channels would decrease with increasing dissimilarity of the messages in each channel. To test this hypothesis, Butchard (1983) presented child and adult subjects with a number of congruent and noncongruent emotional messages. All messages were presented via the verbal and the vocal channels. That is, happy, sad, angry, loving, and neutral statements were stated in happy, sad, angry, loving, and neutral tones of voice. The subjects were asked to indicate the intended emotion by choosing a stick figure representation of the emotion. These stick figure representations were similar to those developed by Dimitrovsky (1964). He found that accuracy of discrimination decreased in both the vocal and verbal channels as the messages became more dissimilar.

His results, in conjunction with the others discussed previously, therefore suggest that multiple messages do in fact interfere with individuals' ability to process information. That is, similar or congruent messages do not tax a subject's processing capacity, and therefore allow good discrimination. Dissimilar or noncongruent messages, however, present competing information from two different channels, reducing a subject's ability to process all the information present, and thus interfere with discrimination. To put the notion in slightly different terms, the more dissimilar mes-

sages in two channels become, the more unclear or ambiguous they become, and the more difficult to discriminate. The information processing deficits caused by the ambiguity of mixed messages, in combination with the deficits caused by high anxiety, might thus produce very strong interference with discrimination of multiple messages indeed.

Anxiety and the Ability to Decode Emotional Messages

The purpose of the present section is to show how anxiety and the perception of emotion seem to be related. Inferences about the relationship might be drawn from various sources. Data are available, for example, on decoding ability as a function of such personality variables as social desirability (Cunningham, 1977; Mehrabian, 1970; Zaidel & Mehrabian, 1969; Solomon & Yaeger, 1969b), neuroticism and extraversion (Cunningham, 1977), and locus of control (Solomon & Yaeger, 1969b). For the sake of brevity, however, let us focus on studies bearing directly on anxiety itself.

In all the studies discussed thus far it is not really known how another individual's verbal behavior is perceived by the anxious child. It is quite possible that the poor performance typically exhibited by an anxious child might be related to his ability to perceive emotional messages, transmitted via the face, the body, or the voice. For example, a high degree of anxiety may cause a child to misinterpret the intended emotion presented in the visual or either

of the auditory channels. The following studies imply that this is indeed the case.

Sarason, Kestenbaum, and Smith (1972) reported that the type of interview to which high and low anxious individuals (adults) were subjected affected later task performance. Specifically, subjects in one group were interviewed about their attitude toward and experiences in testing situations (Test Anxiety Interview). Subjects in a second group were interviewed concerning life at, and the "character" of, their university (Campus Interview). Subjects in both groups had been preselected on the basis of their anxiety scores with the top 16 percent of the distribution designated as high anxious and the bottom 16 percent as low anxious. After the interview, subjects were given a serial learning task. It was found that the Campus Interview had a positive effect on the subjects' performance regardless of their anxiety level (i.e. they made fewer errors on the serial task). The Test Anxiety Interview, however, had a negative effect on the high but not the low anxious subjects, with the high anxious subjects making more errors. It seems reasonable to suggest that particular emotional statements (e.g. interviews) can negatively affect later performance, especially in highly anxious subjects.

It is interesting to note that Shands (1954), in a theoretical article, has suggested that the interfering effects of anxiety on performance (i.e., the selection of

"possible patterns of behavior") may be minimized whenever a situation includes a supportive individual. That is, anxiety can be relieved whenever a situation includes a supportive individual on whom the anxious person may depend for cues as to the appropriate behavior required by a situation.

Solomon and Yaeger (1969b) investigated perception of verbal reinforcers (i.e. verbal evaluative feedback) in fourth grade children as a function of four personality factors, namely, anxiety, locus of control, need for approval, and need for achievement. Each subject took part in two counterbalanced experimental sessions. These sessions were designed to obtain the subjects' perception of recorded verbal evaluations (reinforcers). The verbal reinforcers included three categories of content, namely, positive, neutral, and negative, and three levels of intonation, namely, pleased, indifferent, and displeased. There were four different statements for each content level. A total of 36 statements were generated (4 statements x 3 categories of content x 3 levels of intonation). The statements were presented in two different sessions. The first session was designed to obtain measures of perception in a "vicarious" reinforcement situation. That is, the reinforcers were not directed to the children themselves. In the second or "direct" session, the reinforcers were given in response to the subjects' performance. In the "vicarious" situation, the subjects were told that they would hear some comments made

by a teacher to an art class. They were instructed that after hearing each one they would be asked to answer three questions, each with five possible answers. The first question asked was "What did the teacher mean?....The drawing is : (1) very bad, (2) sort of bad, (3) so-so, (4) pretty good, (5) very good." The second question asked was, "How does the child feel?....He feels: (1) very unhappy....(5) very happy." The third question asked was, "Does the teacher like or dislike the child?....The teacher : (1) dislikes him very much....(5) likes him very much."

In the "direct" situation, the subject was seated in front of an apparatus, and asked to guess the correct button to press on a particular trial in response to a signal light. Each time the signal light appeared, the subject pressed one of three buttons which produced a tape recorded "comment" (i.e. reinforcer) about his choice. Following the "comment" the subject had to press a "right" or "wrong" button to indicate his evaluation of his performance on that trial.

It was found that in the "vicarious" situation, the more anxious children were equally sensitive to intonation and content for questions one and two (i.e. teacher's intent, and the child's feelings respectively). The less anxious children, however, were more sensitive to the content of the statement than to intonation. For question three, representing the teacher's feeling toward the child, the

high and low anxious children were more sensitive to intonation than the moderately anxious children. Anxiety did not affect the subjects' perception of the three questions in the "direct" situation. It was found that children with high scores on the locus of control scale responded to question one (teacher's intent) in the "vicarious" situation more positively than those with low scores. Locus of control was found to be linearly related to judgements in the "direct" situation. The investigators concluded that anxious children pay attention both to content and to intonation in order to avoid unpleasant outcomes, while less anxious children feel safe in depending on content to determine the meaning of emotional evaluations.

In a similar vein, Sogon (1975) investigated the effects of manifest anxiety on the ability of adult judges to decode emotional messages. Subjects were initially administered the Taylor Manifest Anxiety Scale (MAS), and on the basis of their scores were assigned to high, medium, and low categories of anxiety. The top 10 percent of the distribution of scores was designated as high anxious, while the bottom 10 percent was designated as low anxious. Subjects scoring at the mean of the MAS were assigned to the medium category of anxiety. Four subjects were included in each of the three anxiety groups, and were designated as "expressers". Each subject in the expresser groups repeated a standard (i.e. neutral) statement while expressing one of

five emotions: grief, anger, indifference, love, and contempt. A second sample of subjects was also divided into high, medium, and low anxiety groups. These three groups acted as judges and were asked to discriminate which of the five emotions was being communicated. Sogon reported that the high MAS judges had a lower percentage of correct discriminations across all emotions than did the low or medium anxious judges. The data further suggested that highly anxious judges had a lower percentage of correct judgements when decoding positive emotions such as love. These results seem to be consistent with other studies indicating that negative emotions are more easily decoded than positive emotions (Dimitrovsky, 1964; Fenster, Blake-Klebanoff, & Goldstein, 1977). These data also suggest that as anxiety level increases, perception of emotion suffers.

From the previous discussion it is evident that perception of verbal stimuli can affect later performance, especially in the highly anxious individual. The main concern of the present research was to examine the ability of young children to discriminate multiple emotional messages as a function of their general or trait anxiety. Such an investigation was worthwhile for two reasons. First, it could provide a clearer understanding of some of the inconsistencies which are present in the developmental literature regarding aural communication. Second, the bulk of the research on speech communication examining the relative importance of one channel over another has not really con-

sidered personality variables, particularly anxiety, in childrens' ability to discriminate mixed messages of different types. The need for such an investigation seems clear.

The Relationship Between the Perception of Emotion and Subsidiary Variables

As was suggested in the section describing anxiety research, a number of variables extraneous to those of immediate interest may have an undesired effect on the discrimination of emotion. Since the present study was specifically concerned with how children discriminate or decode multiple emotional messages in speech, it will be worthwhile to examine how four variables--sex of encoder, sex of decoder, chronological age, and intelligence--might affect results, and what could be done to take them into account.

Sex of Encoder. While a number of studies have indicated that the encoding of vocally transmitted emotional messages is affected by the sex of the encoder (Dimitrovsky, 1964; Zaidel & Mehrabian, 1969; Bugental, Kaswan, Love & Fox, 1970; Reardon, 1971; Reardon & Amatea, 1973), others report no significant sex differences in encoding ability (Levy, 1964; Zuckerman et al., 1975). Although Bugental et al., (1970) and Reardon (1971) reported that females are better encoders than males, Zaidel & Mehrabian (1969) reported that females were better at encoding only negative emotions. Reardon and Amatea (1973) found that

emotional vocal expressions presented by male speakers were viewed as having more negatively, more socially controlled, and less active meanings than expressions presented by female speakers.

Buck (1975) examined the non-verbal encoding ability of young children in the visual channel. Male and female subjects aged 4 to 6 years were presented with a series of emotionally loaded color slides while they were observed by their mothers via a hidden camera. Videotapes of the children were later observed by groups of undergraduate students. He reported that young children were able to "send" non-verbal information via the visual channel. There was no overall sex differences in sending ability.

Since there is some ambiguity in the results of studies on sex differences in encoding ability, research on this topic should take sex of speaker into account.

Sex of Decoder. A number of studies have also indicated that females are more accurate in decoding expressions of feeling than males (Dimitrovsky, 1964; Zaidel & Mehrabian, 1969; Reardon, 1971). Cunningham (1977), for example, reported that women were better judges of emotion across the visual, vocal, and verbal channels of communication. Other investigators, however, have reported no significant relationship between sex of decoder and perception of emotion (Levy, 1964; Westbrook, 1974a, 1974b). Westbrook (1974b),

in her investigation of sex differences in the perception of emotion, included male and female subjects ranging in age from eighteen to fifty years. She required them to write down what they saw after a fifteen second exposure to each of nine photographic slides. The slides showed two or three males and/or females interacting with varying degrees of expression on their faces. The number of words each subject wrote down implying feeling or emotion which modified these interactions was recorded. An identical procedure was also carried out for auditory emotional cues. It was found that there were no overall sex differences in the subjects' perception of emotion. Furthermore, neither sex was more accurate in decoding particular emotions expressed by the same or opposite sex. Since some of the results with respect to sex differences and the ability to perceive emotion are equivocal, investigators should consider the sex of the decoder as well as the sex of the encoder in any research.

Chronological Age. According to many investigators, even at early ages children are able to communicate using nonverbal cues (Starkweather, 1961; Buck, 1975; Bates, Camaioni & Volterra, 1975; Kaufman, 1977). Gates (1927) had one adult speaker recite the alphabet from A to K while expressing emotions such as happiness, unhappiness, anger, fear, surprise, defiance, and pity. The recordings of these emotions were then presented to a number of subjects selected from grades 3 to 8 inclusive. The results showed that

the ability to identify these emotions correctly steadily increased with the age of the subject. Dimitrovsky (1964) had male and female speakers recite a standard paragraph while they expressed anger, happiness, love, or sadness. The recordings were then presented to children between the ages of 5 and 12 years who had to choose which "stick figure" represented the emotion being presented. She found a gradual but steady increase in the ability to identify the appropriate response correctly as the age of the subject increased. Similarly, Kaufman (1976) in a study investigating the influence of the verbal and the vocal channels as a function of age, presented congruent and incongruent messages to children ranging in age from 2 1/2 to 7 years. She found that the influence of the vocal channel (tone of voice) decreased with age. In addition, she found that the influence of the verbal channel (semantic content) increased with age.

A number of studies have also shown that as the child becomes older, more credence in decision making is given to the vocal channel. Recall for example Butchard's (1983) investigation, which included subjects 7, 9, 11, and 23 years of age. It was found that accuracy of decoding multiple emotional messages presented in the vocal channel increased with age although the opposite was found for the verbal channel. Similar effects have been found by such investigators as Olsen (1967), Solomon and Ali (1972), and Solomon and Yaeger (1969b).

It is interesting to note that some research has shown that the ability of young children to perceive emotion is not only dependent upon the ability of the encoder to transmit emotional messages, but also upon the relationship between the child and the encoder (Daley, Abramovitch, & Pliner, 1980; Abramovitch, 1977). Daley et al. (1980) for example, videotaped mothers of five-year-old children while the mothers viewed slides designed to elicit pleasant, disgusted, or neutral expressions. Each child then looked at tapes of his/her own mother plus slides of mothers judged to be good or poor encoders. It was found that all children were significantly able to decode all three types of expressions. However, decoding accuracy of the child was related to his/her mother's encoding ability. That is, the children of mothers who were classified as good encoders did better than children whose mothers were classified as poor encoders. In a similar vein, Abramovitch (1977) reported that preschool children were able to decode information about the kind of interaction in which the sender was engaged only when the sender was his/her own mother.

Other studies investigating developmental trends associated with decoding of nonverbal auditory communication have found that children are able to decode nonverbal communications even when strangers act as senders (De Paulo & Rosenthal, 1979; McClusky, Albas, Niemi, Cuevas & Ferrer, 1975; Dimitrovsky, 1964).

Since the data just reviewed suggest that the ability to decode multiple emotional messages is related to age, research investigating perception of emotion should consider the age of the subject in the design either by varying it, or to simplify matters, by choosing one age group on an a priori basis.

Intelligence. A final variable which must be considered in research concerned with discrimination of emotional messages is intelligence. Data indicate that there can be a positive correlation between intelligence and the ability to discriminate vocally transmitted emotional messages. Dimitrovsky (1964) reported a correlation of $+0.67$ between accuracy of emotional identification and intelligence. Significant positive correlations between verbal intelligence and accuracy of identification of vocally portrayed emotions have been reported by other investigators as well (Levy, 1964; Davitz, 1964b). Any investigation of decoding ability must include an examination of the relationship between intelligence and discrimination to find if effects should be controlled by procedures such as covariation. Should the effects of intelligence be disregarded, spurious results might occur and negate conclusions about a child's ability to decode multiple emotional messages.

Statement of the Research Problem

According to Spielberger (1966), anxiety is a most pervasive condition in modern society. The majority of data in the area reviewed previously indicates that anxiety has a disruptive effect on behavior (e.g., Goulet & Mazzei, 1969; Merryman, 1974; Meuller, 1976).

Cognitive and Response Competition theories of anxiety suggest that this disruptive effect occurs as a result of response competition. In other words, when an irrelevant internal response to a situation (anxiety in the form of worry) competes with a relevant, external, task-related response, behavior is disrupted. Accordingly, anxiety may narrow an individual's attentional field such that he disregards or misinterprets environmental cues (Sarason, 1975; Easterbrook, 1959); or it may produce an increased informational load, leading to a processing dysfunction and hence a disruption of behavior (Hamilton, 1975).

Hamilton (1975) states that anxiety develops early in childhood, and he broadly defines the factors which produce anxiety as "adverse conditions". Some investigators refine such a definition to include specific conditions such as constant critical evaluations by parents (Sarason et al., 1960; Katz, 1967), while others argue that it is the frequency of punishment which produces anxiety (Spielberger, 1966).

The disruptive effect which anxiety exerts on behavior typically found in adult subjects has also been found in children. For example, a number of studies have shown that high levels of anxiety in children disrupt performance on such tasks as reading (Merryman, 1974), discrimination learning (Palermo et al., 1956; Castaneda et al., 1956b), and problem solving (Sarason et al., 1958).

An area of investigation which is receiving increased empirical attention concerns ability to perceive emotion. A number of studies have reliably demonstrated that children and adults are able to discriminate non-verbal speech communication (e.g., Starkweather, 1961; Kaufman, 1977).

It should be pointed out that many of the studies investigating children's ability to perceive emotional speech messages have typically focused on the vocal channel while holding the verbal channel constant (e.g. Gates, 1927; Dimitrovsky, 1964; Fenster & Goldstein, 1971). More recently, however, a greater emphasis has been placed on children's ability to discriminate emotional messages in two or more channels (Bugental et al., 1970a, 1970b; Bugental et al., 1971; Butchard, 1983; McClusky, 1980). While such studies are important for the understanding of multichannel communication, they have nevertheless paid limited attention to the role of personality characteristics of the child.

A limited number of studies, however, have indicated that the ability to perceive or discriminate emotional messages can be affected by personality variables such as anxiety. Sogon (1975), for example, found that highly anxious adult judges made more errors in discriminating emotional messages than either moderate or low anxious adult judges. Again for example, Solomon and Yaeger (1969b) investigated the perception of verbal evaluative feedback of fourth grade boys, and also found that more anxious boys paid greater attention to the content of the message and the intonation of the speaker, while less anxious boys focused primarily on the content of the message.

These latter studies, while instructive and informative, do not allow clear-cut inferences about anxiety's effects on the discrimination of different types of multiple messages. Such inferences are possible, however, through consideration of (a) theory and data on anxiety effects, (b) the characteristics of multiple messages, and (c) research on the perception of emotion. These inferences formed the basis for the hypotheses tested in the present research, as outlined below.

Predictions Concerning the Effect of Anxiety on Multiple Message Discrimination

Before the predictions in the present study are formulated, a comment is in order about effects that could occur in the vocal as compared to the verbal channel. It seems

reasonable that if anxiety, or type of message, or their interaction affected discrimination, this would occur in both channels. On the one hand, some data (e.g., Mehrabian & Wiener, 1969) show that adult subjects pay greater attention to the vocal channel, and thus suggest that any effect might be more apparent in that channel. On the other, for example, Butchard's (1983) finding that children pay greater attention to the verbal channel suggests that the reverse would occur. Inconsistencies such as these, the overall complexity of results for multichannel communication, and the relative paucity of studies on the role of anxiety in communication, especially in children, did not really permit a firm inference as to relative strength of an effect in one versus the other channel. For the predictions about anxiety and type of message outlined below, then, it is suggested simply that effects would occur in both channels.

Both the Cognitive Social Learning Theory and the Response Competition and Information-Processing Capacity Model of anxiety suggest that anxiety is a task-irrelevant response which interferes with task-related relevant behavior. These theories also suggest that particular types of interactions between models (e.g., parents) and observers (e.g., children) may produce anxiety (Sarason 1975; Hamilton, 1975).

Data in the area have provided some support for the Response Competition Theory of anxiety. For example, it has

been reported that anxiety interferes with such behaviors as paired associate learning (Goulet & Mazzei, 1969), reading (Merryman, 1974), school achievement (McCandless & Castaneda, 1956), and discrimination of emotion (Sogon, 1975).

These theories, supported by the bulk of the anxiety research on the disruptive effects of anxiety on behavior, allow one to hypothesize therefore, (1), that highly anxious children would be less accurate in discriminating multiple emotional messages than would low anxious children in both the vocal and verbal channel. That is, one might expect there would be greater competition or interference by irrelevant responses in highly anxious children, resulting in less accurate discrimination of multiple messages.

Data reviewed in the section on multichannel communication suggest that mixed messages interfere with subjects' ability to process information. Also, recall Butchard's (1983) study. Briefly, he found that congruent messages were discriminated more accurately than noncongruent messages in both the vocal and verbal channels. From a theoretical perspective, his and other results can be interpreted as follows: conflicting messages as well as incongruent messages are less clearly defined than are congruent messages. It seems logical that these types of messages would, therefore, present competing information that would tax the processing capacity of the individual, and thus be less easily discriminated than congruent messages.

It can also be argued that conflicting messages are very ambiguous because two opposing elements are presented simultaneously, while incongruent messages are only somewhat ambiguous because two different (but not opposing) elements are presented simultaneously. That is, conflicting messages place an even greater burden on the capacity of the system to process information than do incongruent messages. It was hypothesized, therefore, (2) that in both the vocal and verbal channels, congruent messages would be discriminated most accurately, incongruent messages less accurately, and conflicting messages the least accurately, because each type in turn is more ambiguous than the previous and therefore more difficult to process.

Although the relationship between anxiety level and children's ability to discriminate multiple messages is not precisely known, data in the area suggest that anxiety would have a debilitating effect. This notion is reinforced somewhat directly, for example, by one of the studies on the interactive effects of anxiety and perception of emotion on behavior reviewed previously: Sarason et al. (1972) showed that particular emotional statements which were anxiety-related disrupted later task performance more for very anxious adult subjects than for low anxious subjects.

It was suggested that conflicting and incongruent messages are more ambiguous and difficult to process than congruent messages, thereby presenting a greater opportunity for interference with discrimination. Anxiety theory sug-

gests that more anxious children are less attentive to or able to process informational cues than less anxious children. The overall capacity of the system to process information is presumably a joint function of the ambiguity of messages, and the debilitating effects of anxiety. It seems reasonable, then, that the interfering effect of conflicting and incongruent messages would be greater for more anxious children than less anxious children. Hence, more anxious children would be less able than low anxious children to discriminate conflicting and incongruent messages. Similarly, it seems reasonable to predict such a pattern for the discrimination of incongruent versus congruent messages. It was therefore reasonable to hypothesize (3), that in both the vocal and verbal channels, as anxiety level increased, discrimination ability would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages.

Management of Subsidiary Variables

The investigation of the perception of emotion as a function of anxiety requires manipulation or control of variables extraneous to those of central experimental interest. How such variables were dealt with in the present study warrants comment at this point.

The first variable was sex of speaker. While a number of investigators have found significant sex differences in encoding ability (Dimitrovsky, 1964; Bugental et al., 1970; Reardon, 1971), others have found no significant sex differences (e.g. Levy, 1964). In order to account for any possible effects due to differences in sex of speaker, both male and female speakers were included in the present study.

A second factor which was considered was sex of subject. Although a number of investigators have shown that females are more accurate than males in their ability to discriminate emotional messages (e.g. Davitz, 1964; Dimitrovsky, 1964), others have found no significant sex differences (Westbrook, 1974a, 1974b). It thus seemed necessary to include sex of subject as a variable in the present research in order to control for and to examine possible subject sex differences which could occur.

A third variable worth considering was the age of the subject. Recall that age seems related to anxiety and to the perception of emotion, and thus should be considered in research in the area. As suggested previously, there were two possible strategies. First, age could have been included as a variable. This seemed unwise in a first study of this type because of the complex interactions which might occur. The second strategy, and the one used here, was to use one school grade level only. Grade four was chosen in particular because research discussed previously suggests that at this time, anxiety is detectable but moderate. In

other words, at this grade level, the effects of anxiety would hopefully be neither too low nor too high, and the possibility of obviating any effects of other variables would be reduced. That is, if the children in the study were too young, a "basement" effect might have occurred and negated the possibility of finding any interaction with other variables. Similarly, if the children were too old, a "ceiling" effect might have occurred and negated the possibility of finding a significant interaction with other variables.

A fourth variable worth considering was intelligence. Some research in the area indicates that there is a significant negative relationship between anxiety and intelligence (e.g., Sarason et al., 1960). Other studies have found a complex interaction between anxiety and intelligence (Spielberger, 1966; Denny, 1966). Researchers investigating the relationship between intelligence and perception of emotion have shown that there is a significant positive correlation between these two variables (e.g., Dimitrovsky, 1964). It thus seemed necessary to measure intelligence and to find if it would be necessary to partial out and eliminate its effects.

A fifth and final variable worth considering was defensiveness. Since a number of investigators have demonstrated a significant negative relationship between anxiety and defensiveness (e.g., Hill & Eaton, 1977), any effects

due to defensiveness were worth measuring to find if defensiveness should be partialled out.

For the sake of clarity, before the method and results are considered extensively, a brief overview of the predictions and the design of the study may be helpful.

Predictions

Previous discussion allows in summary the following predictions with respect to childrens' ability to decode multiple emotional messages:

1. Highly anxious children would be less accurate than low anxious children in discriminating multiple emotional messages, in both the vocal and the verbal channels.
2. Congruent messages would be discriminated most accurately, incongruent messages would be discriminated less accurately, and conflicting messages would be discriminated the least accurately, in both the vocal and verbal channels.
3. As anxiety level increased, discrimination ability would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages, in both the vocal and verbal channels.

Overview of Design

The present research investigated the ability of grade four male and female subjects to decode congruent, incongruent, and conflicting emotional messages as a function of their trait anxiety. The study was performed in two phases. Phase 1 was the "anxiety determination" phase where all subjects received the What I Think and Feel (WITF) test in order to determine their level of trait anxiety. Phase 2 was the "discrimination of emotion" phase. During phase 2 all subjects were asked to listen to congruent, incongruent and conflicting emotional messages spoken by women or men. The messages contained five emotional statements said in five tones of voice. Statements and tones were either happy, sad, angry, loving, or neutral. The subjects indicated the intended emotion of the speaker by placing a check under one of five stick figure drawings designed to represent the five emotions. The number of correct choices with respect to the intended emotion was recorded for each stimulus in both the verbal and vocal channels.

In order to determine, and control for if necessary, the effects of defensiveness and intelligence, a lie score and IQ score were calculated.

The research included four independent variables namely, trait anxiety, type of message, sex of speaker and sex of subject. Trait anxiety, sex of speaker, and sex of sub-

ject were between subject variables; whereas, type of message was a within subject variable. The data were subjected to multivariate analyses of variance, followed by univariate analyses, and post hoc comparisons where appropriate.

METHOD

Subjects

A total of 116 children enrolled in grade four classes at the time of the experiment served as subjects. Two subjects were 11 years of age $\pm$ 4 months. The remainder were nine years of age $\pm$ 6 months. Half the subjects were males, and half were females. All were drawn from three elementary schools in the Winnipeg School Division. To control for possible effects due to socioeconomic level, the schools were chosen from areas which had a relatively equal middle-class socioeconomic status according to criteria set out by the Winnipeg School Division.

Apparatus

Anxiety measurement material. Trait anxiety was measured using the 37 item What I Think and Feel (WITF) test (Reynolds & Richmond, 1978). The test consisted of a total of twenty-eight anxiety items, and nine additional items designed to provide an index of a subject's tendency to falsify responses. A copy of the WITF is presented in Appendix A.

Verbal-vocal stimuli. The verbal stimuli used in the present research were those prepared by Butchard (1983) employing the following criteria: First, each statement conveyed a particular intended emotion (happiness, sadness, anger, loving, neutral). Second, each statement was representative of common statements made from one person to another. Third, each statement was not to contain the emotional label which defined the category. In other words, a happy statement could not contain the word "happy". All statements were from six to twelve words in length.

Butchard (1983) and four graduate students initially generated twenty-five statements which consisted of five statements for each of the five emotions. All statements were mimeographed on sheets of paper with a choice of five emotional states listed beside them. The sheets were distributed to thirteen female and twelve male students in an undergraduate psychology class. These raters were asked to indicate what emotions each of the twenty-five statements conveyed. The statements which produced the highest percentage of rater agreement (80% or over) as to the intended emotional content were chosen as the final stimulus statements. The one exception was the neutral category for which the statement with the highest percentage of agreement was chosen (100%). This was done to ensure that the neutral statement was free of any emotional information. The final five statements are presented in Appendix B.

The five verbal emotional statements were then given to four male and four female psychology graduate students, who recited each of these verbal statements while expressing one of the five emotions of interest (happy sad, angry, loving, and neutral). The procedure resulted in 25 stimuli consisting of all possible combinations of emotions in the verbal and vocal channel said by 8 speakers. The total of 200 verbal-vocal pairs (5 verbal X 5 vocal X 8 speakers) were then passed through a low band pass filter, which removed all frequencies above 450 Hz, and thus rendered the content unintelligible.

These stimuli were then played to 20 male and 20 female undergraduate raters who were asked to specify what emotion was being portrayed by the speaker. The emotional messages with the highest percentage of rater agreement as to the intended emotion were chosen for the male and the female speakers.

In the preparation of the verbal-vocal stimuli, Butchard found that certain male and female speakers expressed some of the intended emotions more credibly than other speakers. These male and female speakers were employed to express more than one emotion. The final verbal-vocal stimuli were ultimately prepared utilizing only the male or female speaker who best conveyed an intended emotion. The final 50 verbal-vocal pairs (25 for the male speakers, and 25 for the female speakers) were chosen employing two specific

criteria. First, these sample stimuli had to show the highest agreement between the intended and perceived emotion. Second, the accuracy of the portrayal of these stimuli had to be approximately the same for the male and female speakers. The final speech samples were randomly recorded on two stimulus audio tapes (one tape for males, another for females). The order in which the samples were recorded is presented in Appendix C.

In the present study, these same 50 speech stimuli were delivered through a commercial Sony tape recorder, model number 110B.

Discrimination stimulus materials. Each subject's ability to discriminate emotional messages was determined by asking him or her to choose a male or female stick figure representation of the five emotions. The technique was employed by Dimitrovsky (1964), who used five such figures to determine four basic emotional states (one for each of happy, sad, angry, and two for loving). However, some modifications of that procedure were incorporated into the present research. A neutral stick figure was included in the present research, as Fenster (1967) reported that a neutral category increased the interpretability of results. Furthermore, only one of Dimitrovsky's "loving" representations was used in the present research. These modifications were similar to those used by McClusky (1974), and identical to those employed by Butchard (1983). The stick drawings rep-

resenting male and female figures appeared on 20.5 X 27 cm paper. Half of the subjects received figures going from happy on the right to loving on the left, while the remaining half received figures going from happy on the left to loving on the right. See Appendices D and E, respectively, for male and female stick drawings.

Procedure

The overall procedure for the experiment consisted of two phases. Phase 1 constituted the "anxiety determination" phase while phase 2 constituted the "discrimination of emotion" phase.

Phase 1. Anxiety determination. Phase 1 was instituted in the subjects' own classrooms. Both male and female subjects were given the WITF by a confederate of the experimenter so as to reduce any association with the experimenter, and hence, artifactual intrusion on the phase 2 manipulation. Upon entering the classroom, the confederate was introduced by the teacher. Subjects were asked to accompany the confederate in groups of 4 (2 males & 2 females) to another room, a small resource room in the school which was not regularly used. Four desks and chairs were placed in each corner facing the centre of the room. This was done in order to create the greatest separation of subjects and to allow all subjects direct visual contact with the examiner who stood in the middle of the room. The distance of the

experimenter from any subject was approximately 1 meter. The WITF response sheets were then handed out to all the subjects. The confederate then indicated that all subjects would be asked a number of simple questions about themselves. All items were read to the subjects by the confederate. Such a procedure was utilized in order to help control for any possible differential reading abilities. A slightly modified version of the instructions presented by Sarason et al. (1960) (i.e., substituting a more applicable example than the one they used), was read as follows:

I'm going to be asking you some questions today - questions different from the usual school questions. These are about how you think and feel and so have no right or wrong answers. No one but myself will see your answers. Remember because these questions are about how you think and feel, there is no right or wrong answer. You are to listen to each question and then put a circle around either "yes" or "no". The person sitting next to you might put a circle around "yes" and you might put a circle around "no". For example, if I asked this question: Do you like indoor recess? Some of you might circle "yes" and some of you might circle "no". Your answer depends on how you think and feel. Listen carefully to each question and answer it "yes" or "no" by deciding how you feel. If you don't understand a question ask me about it. Now let's start by everyone putting their finger on question number one. Here is the first question

When all the subjects had completed the WITF, the number of "yes" responses to the 28 anxiety items were summed to yield one basic anxiety score for each subject. The subjects were then assigned to one of three anxiety groups, namely, low, moderate, or high. The low anxiety group included those subjects whose score fell between two and three

standard deviations below the mean. The scores ranged from 0 to 5. The moderate group included those subjects whose score fell between +1 and -1 standard deviations from the mean. The high anxiety group included those subjects whose scores fell between two and three standard deviations above the mean. The scores ranged from 21 to 27.

The nine lie items answered "yes" were also summed in order to obtain an index of each subject's tendency to falsify his responses. The lie scores were obtained in order to be able to examine any relationship between anxiety and defensiveness.

Phase 2. Discrimination of emotion. The discrimination of emotion phase was comprised of two phases, namely, pre-training and actual discrimination testing. All subjects were again tested in groups of 4 (2 males and 2 females).

Pretraining. Twenty-four hours following the administration of the WITF, the subjects accompanied the experimenter into a separate room described previously. They were given the discrimination material consisting of 25 sheets of paper, one for each vocal-verbal stimulus presented. Each contained either five male or five female stick figure drawings. They were told that these figures were "a happy man (lady), an angry man (lady), a sad man (lady), a loving man (lady) and a man (lady) who is just standing there talking. He (she) isn't angry, sad, loving, or happy." The subjects

were trained to associate each of the five pictorial representations with its specific emotional category. That is, each subject was asked to point to the specific drawing which depicted one of the five emotional categories. Each subject had to reach a criterion of two consecutive correct identifications of all five emotions for each of the male and female sets of pictures before the actual testing procedure began.

Discrimination testing. Immediately following the pre-training trials, discrimination testing was undertaken to determine the intended emotion for each taped stimulus. The following instructions given the subjects were those prepared by Butchard (1983):

You are now going to hear some men (ladies) say a number of different things. They will say the same thing more than once but will say it in different ways. Some of the things they say will sound happy, some sad, some angry, and some will sound as though the person is just talking or reading out loud. Listen to each one and place a check mark under the man (lady) it sounds like. Does it sound like the happy man (lady), the sad man (lady), the angry man (lady), or the man (lady) who is just standing there talking. Remember, listen to both what the person says and how they say it.

The final direction indicating the order in which the subjects were instructed to listen to the tape recordings was counterbalanced. That is, half of the male and female groups were instructed to listen to "what the person says and how they say it" while the remaining half were instructed to listen to "how the person sounds and what they say."

The counterbalancing procedure was used in order to reduce the possibility of a specific listening "set".

To ensure that the subjects understood the required task, the following second set of instructions prepared by Butchard (1983) was given:

Now which figure would you put a check mark under if the man (lady) said "I am angry with you." Which one if the man (lady) said "I love you." Which one if they said "I am happy." Which one if they said "I am sad." Which one if they said "The sky is blue."

All subjects were able to do this immediately.

Groups of 2 male and 2 female subjects then heard the 25 taped emotional messages. Half of the male and female subjects were asked to listen to the tape recording of male speakers, while half of the male and female subjects were asked to listen to a tape recording of female speakers. For each presentation, each subject indicated the intended emotion of the speaker by placing a check mark on a sheet of paper containing the five stick figure drawings. There was one sheet for each of the 25 emotional messages. Following the presentation of the last emotional message, all subjects were given the Peabody Picture Vocabulary Test. The resulting IQ score was obtained in order to find if it would be necessary to control for the possible effects of intelligence on discrimination of emotion (Dimitrovsky, 1964; Levy, 1964). The Peabody Picture Vocabulary Test was used here because it is the most commonly used test of children's verbal ability.

RESULTS

The results are dealt with as follows: first, a brief discussion of the rationale for the major analysis used and the rules for graphical presentation; second, an overview of the preliminary analysis with reference to variables extraneous to those of major concern; and third, a detailed description of the data obtained in which accuracy of discrimination was analyzed for the vocal and verbal channels.

Rationale for Analysis

Since the present study had two dependent variables--accuracy of detection of the intended emotion in the vocal channel, and accuracy of detection of the intended emotion in the verbal channel--one multivariate analysis including these two variables would seem appropriate at first glance. However, since a high correlation between the two dependent measures occurs when the same emotion is presented in both channels, analyzing the two dependent measures simultaneously would be inappropriate. Analysis of effects for each channel separately was necessary. The question remained of determining the kind of analysis to perform on results for each channel.

The decision to employ a univariate or multivariate analysis of repeated measures data typically is dependent upon the pattern of correlations and variances of the dependent measures. If the assumption of compound symmetry is met (i.e., all variances and correlations are equal), a univariate analysis is more powerful (Finn, 1980). However, in the present study there were 25 dependent variables in the vocal channel and 25 in the verbal channel (i.e., responses to the intended emotion in each channel). These many variables would almost certainly cause the symmetry assumption to be violated. Therefore, the use of a univariate analysis was not deemed appropriate. As well, multivariate analysis provides a measure of protection from the inflation of statistical error rates which can occur when a number of univariate analyses are employed to analyze many dependent variables (Tatsuoka, 1971).

The fact that there were disproportionate numbers of subjects for each level of the anxiety variable was of particular concern in the present analysis and requires special consideration. When there are disproportionate N's in analysis of variance designs, estimates and tests of the various parameters are not independent of one another (Finn & Mattsson, 1978). If this fact is ignored, tests of various effects would be intercorrelated and would tend to inflate the statistical error rates. There is also a danger of attributing variation to one effect which may be due to another, because the two are interrelated. In order to

avoid this interdependence of effects caused by a disproportionate number of subjects, a specified order of main effects and interactions is established (Finn & Mattsson, 1978). Design factors of primary importance are typically placed in later positions. In the present study for example, anxiety which was of primary importance was tested last. In this way, the effect of anxiety was tested unfounded by the sex of the speaker and the sex of the subject.

In order to analyze the within-subject factors and their interaction with the between-subject factors, a repeated measures multivariate analysis of variance (MANOVA) was utilized.

Graphs of effects for anxiety and type of message are presented for all measures. Otherwise, for convenience and clarity, only significant effects are graphically illustrated. Two conventions were followed in the production of the graphs in order to enhance clarity of presentation and ease of explanation. First, the ordinate of each graph was produced using the "mean accuracy score" (i.e., the average number of correct responses to the intended emotion divided by the total possible). Second, unweighted or raw data were plotted in all cases. This was done despite the fact that the data used for the analysis were weighted by the analytic procedure. Discussion of plotted data is made with reference to weighted data.

Preliminary Analysis

The design of the study included six independent variables: anxiety, type of message, sex of speaker, sex of subject, defensiveness, and intelligence. Previous research has indicated that both defensiveness and intelligence are significantly correlated with anxiety (Sarason et al., 1960; Hill & Sarason, 1966). In order to determine in the present study if a significant relationship existed between defensiveness and anxiety, and between intelligence and anxiety, two Pearson correlations were computed. A small negative correlation was obtained for intelligence and anxiety level ($r = -.18$, $p > .05$) and for defensiveness and anxiety ($r = -.14$, $p > .05$). Since these correlations were small and nonsignificant, and would not appreciably affect the outcome of further analyses, intelligence and defensiveness were not considered in any analysis of discrimination in the vocal or the verbal channel in relation to anxiety.

Previous research has also indicated that intelligence and ability to discriminate vocal messages can be positively correlated. To find if any such effect occurred for either channel in the present research, a set of six correlations was run on the relationship between subjects' scores on the Peabody Picture Vocabulary Test--the measure of intelligence used here--and accuracy in the vocal and verbal channels for each of the three types of messages, as follows: The number of correct judgements for each of the 25 vocal-verbal pairs

of emotions was obtained for each of the 116 subjects for each channel. Each judgement was given a score of one if the vocally presented emotion had been identified correctly, or a score of zero if the emotion had not been identified correctly. Likewise, in the verbal channel, each judgement was given a score of one if the verbally presented emotion had been identified correctly, or a score of zero if the emotion had not been identified correctly. For the vocal channel, correlations were computed between the Peabody Picture Vocabulary Test score and accuracy of discrimination for congruent, incongruent, and conflicting messages. Values were 0.11, 0.17, and 0.17, respectively. Likewise, for the verbal channel, correlations were computed between the Peabody scores and accuracy of discrimination for the three messages. Values in this case were 0.11, -0.12, and -0.13, respectively. No correlations were significant ($p > 0.05$). Since only small, non-significant correlations were obtained, it was likely that intelligence did not affect discrimination scores and would not appreciably affect the outcome of further analysis. Thus, intelligence was not included in reference to analysis of the discrimination data.

The results are presented in two parts for ease of comprehension. The first is the analysis of subjects' accuracy in detecting the intended emotion in the vocal channel; the second, the analysis of accuracy in detecting the intended emotion in the verbal channel.

For both parts, main effects and interactions for anxiety and type of message are presented first as these were of major concern to the present research. Other main effects and interactions are presented subsequently. While significant higher order interactions are reported, they are not discussed at length. Non-significant effects are presented only briefly.

Accuracy of Discrimination in the Vocal Channel

A multivariate analysis of variance (MANOVA) was conducted on the raw scores for vocal accuracy described above for three levels of anxiety, three levels of type of message, two levels of speaker sex, and two levels of subject sex (Finn, 1976).

One restriction of the multivariate analysis is that the dependent variables may not be a linear combination of one another (Finn & Mattsson, 1978). In order to correct for problems of linearity, one of the variables involved in the analysis must be removed. With respect to the analysis of the data in the vocal channel, all the variance in the dependent variables could be accounted for by 24 of the variables, thereby producing a problem of linearity. As a result, one vocal-verbal pair had to be deleted from the analysis. Since none of the subjects correctly identified the loving-neutral pair, this pair was dropped from the analysis. Thus, the MANOVA for accuracy of discrimination

in the vocal channel was ultimately based on 24 emotional messages. An alpha level of .10 was used for the multivariate test statistics due to the conservative nature of the analysis (Hummel & Sligo, 1971). The results of the MANOVA are summarized in Table 1.

TABLE 1

Summary of the Multivariate Analysis of Variance for
Discrimination Ability in the Vocal Channel

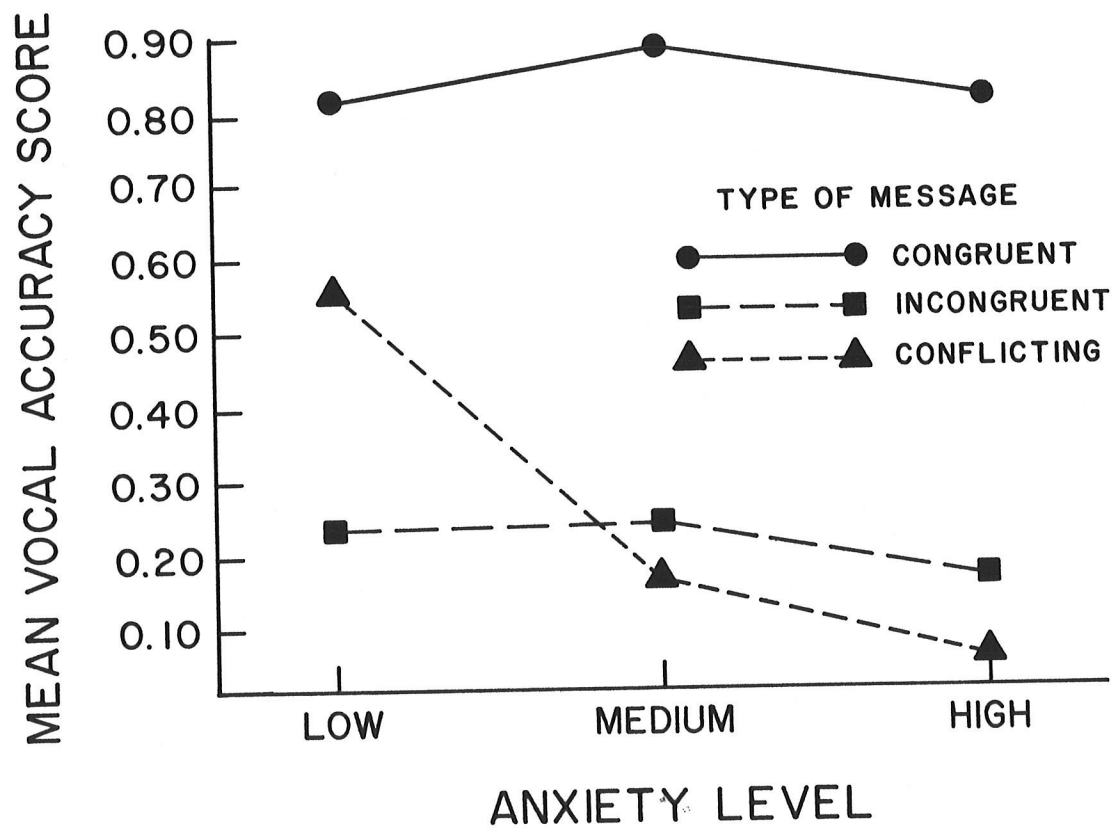
<u>Source</u>	<u>df</u>	<u>F</u>	<u>p</u>
Anxiety (Anx)	48,162	3.15	<.0001
Type of Message (Msg)	3,102	1310.67	<.0001
Sex of Speaker (Spkr)	24,81	4.43	<.0001
Sex of Subject (Subj)	24,81	1.12	<.23
Anx x Msg	6,204	10.16	<.0001
Msg x Spkr	3,102	1.99	<.12
Msg x Subj	3,102	4.32	<.007
Anx x Spkr	48,162	1.28	<.13
Anx x Subj	48,162	1.14	<.28
Spkr x Subj	24,81	1.09	<.37
Anx x Spkr x Subj	48,162	.96	<.56
Msg x Spkr x Subj	3,102	.32	<.81
Anx x Msg x Spkr	6,204	.46	<.84
Anx x Msg x Subj	6,204	.43	<.99
Anx x Msg x Spkr x Subj	6,204	.28	<.95

Effect of Anxiety Level on Discrimination Ability

It was predicted that high anxious children would be less accurate than low anxious children in their ability to discriminate multiple emotional messages. By weighting the mean for each experimental condition by the corresponding raw discriminant weights, group centroids were constructed which reflected overall performance. Figure 1 shows raw means as a function of anxiety level and type of message. Inspection of Figure 1 suggests that overall, more anxious subjects made more errors in discriminating multiple emotional messages than did less anxious subjects. The means were .43 for low anxious subjects, .38 for moderately anxious subjects, and .32 for high anxious subjects. In corroboration, a significant multivariate main effect for anxiety was obtained (Multivariate $F(48,162)=3.15$, $p<.001$).

Further to the overall main effect, a comparison of centroids for the low and moderate anxiety groups indicated that low anxious children discriminated emotional messages more accurately than moderately anxious children (Multivariate $F(24,81)=5.31$, $p<.001$). As well, a significant effect was found for the comparison between low versus high anxiety groups (Multivariate $F(24,81)=2.99$, $p<.001$), with low anxious subjects performing better than high anxious subjects. The difference between moderate and high anxiety was not found to be significant (Multivariate $F(24,81)=1.12$, $p<.34$), indicating similar performance by these two groups.

Figure 1: Mean accuracy score as a function of anxiety and type of message in the vocal channel



Effect of Type of Message on Discrimination Ability

It was predicted that subjects would discriminate congruent messages most accurately, incongruent messages less accurately, and conflicting messages least accurately. Inspection of Figure 1 suggests that this prediction was partially supported, with congruent messages discriminated most accurately. Conflicting messages, however, seemed to be discriminated more accurately than incongruent messages. Means were .83 for congruent messages, .23 for incongruent messages, and .26 for conflicting messages. The analysis revealed a significant multivariate main effect for type of message (Multivariate $F(3,102)=1310.67$, $p<.001$).

In order to determine which type of message had a significant effect upon discrimination ability, the type of message data were reconstructed and formed into specific contrasts. A multivariate analysis was conducted in which the following levels of the type of message factor were compared: congruent minus noncongruent (conflicting + incongruent) messages; and, conflicting minus incongruent messages. The analysis yielded a significant multivariate effect for type of message (Multivariate $F(2,103)=324.33$, $p<.001$). The analysis further yielded a significant effect for the congruent minus noncongruent comparison ($F(1,104)=644.76$, $p<.001$). That is, congruent messages were discriminated more accurately than noncongruent messages. No significant effect was found for the conflicting minus incongruent con-

trast ($F(1,104)=1.56$, $p<.21$), indicating no difference in subjects' ability to discriminate between these messages. Results of this second multivariate analysis of variance are presented in Table 2.

TABLE 2

Summary of Multivariate Analysis of Variance for Differences
Between Type of Message Contrasts

<u>Source</u>	<u>df</u>	<u>F</u>	<u>p</u>
Anxiety (Anx)	48,162	3.15	<.0001
Type of Message (Msg)	2,103	324.33	<.0001
Sex of Speaker (Spkr)	24,81	4.43	<.0001
Sex of Subject (Subj)	24,81	1.15	<.23
Anx x Msg	4,206	18.19	<.0001
Msg x Spkr	2,103	4.12	<.02
Msg x Subj	2,103	3.96	<.02
Anx x Spkr	48,162	1.28	<.13
Anx x Subj	48,162	1.14	<.28
Spkr x Subj	24,81	1.09	<.37
Anx x Spkr x Subj	48,162	.96	<.56
Msg x Spkr x Subj	2,103	.22	<.81
Anx x Msg x Spkr	4,206	.27	<.90
Anx x Msg x Subj	4,206	.82	<.52
Anx x Msg x Spkr x Subj	4,206	.45	<.76

Effect of Anxiety Level and Type of Message on Accuracy of Discrimination

Recall from the Introduction the prediction that as anxiety level increased, discrimination ability would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages. Inspection of Figure 1 suggests that congruent messages were discriminated more accurately than conflicting and incongruent messages at all levels of anxiety. Figure 1 also suggests that at the low level of anxiety, subjects discriminated conflicting messages more accurately than incongruent messages. As anxiety level increased to moderate and high levels, incongruent messages seemed to be discriminated more accurately than conflicting messages. In corroboration, a significant multivariate anxiety by type of message interaction was found (Multivariate $F(6,204)=10.16$, $p<.001$).

In addition to the anxiety by type of message interaction, the analysis yielded a significant multivariate effect for the comparison of low versus moderate anxiety across type of message (Multivariate $F(3,102)=18.12$, $p<.001$). As well, a low versus high anxiety effect (Multivariate $F(3,102)=13.26$, $p<.001$) and a moderate versus high anxiety effect was found (Multivariate $F(3,102)=2.46$, $p<.07$), indicating that all three levels of anxiety significantly affected the congruent, incongruent, and conflicting messages taken as a "set".

In order to determine possible individual effects for each type of message, the data were further analyzed. The analysis yielded a significant univariate effect for the conflicting messages only ($F(2,104)=25.28$, $p<.001$), indicating that conflicting messages were significantly affected by anxiety level while incongruent and congruent messages were not. While the analysis indicated a tendency toward significance for congruent messages ($F(2,104)=2.24$, $p<.11$) incongruent messages were found not to be significantly affected by anxiety level ($F(2,104)=.59$, $p<.56$). In other words, as anxiety increased, accuracy of discrimination decreased only for conflicting messages.

Multiple post hoc comparisons were employed in order to compare the incongruent and the conflicting messages at each level of anxiety (Tukey, 1953). The alpha level was set at .01 for each comparison. The results indicated that conflicting messages were discriminated more accurately than incongruent messages at the low level of anxiety. Incongruent messages, on the other hand, were discriminated more accurately than conflicting messages at the moderate and high levels of anxiety.

Effect of Speaker Sex on Discrimination Ability

Group means associated with subjects' responses to male and female speakers were .38 and .40, respectively, suggesting that subjects discriminated multiple emotional messages more accurately when the speakers were female. In corrobo-

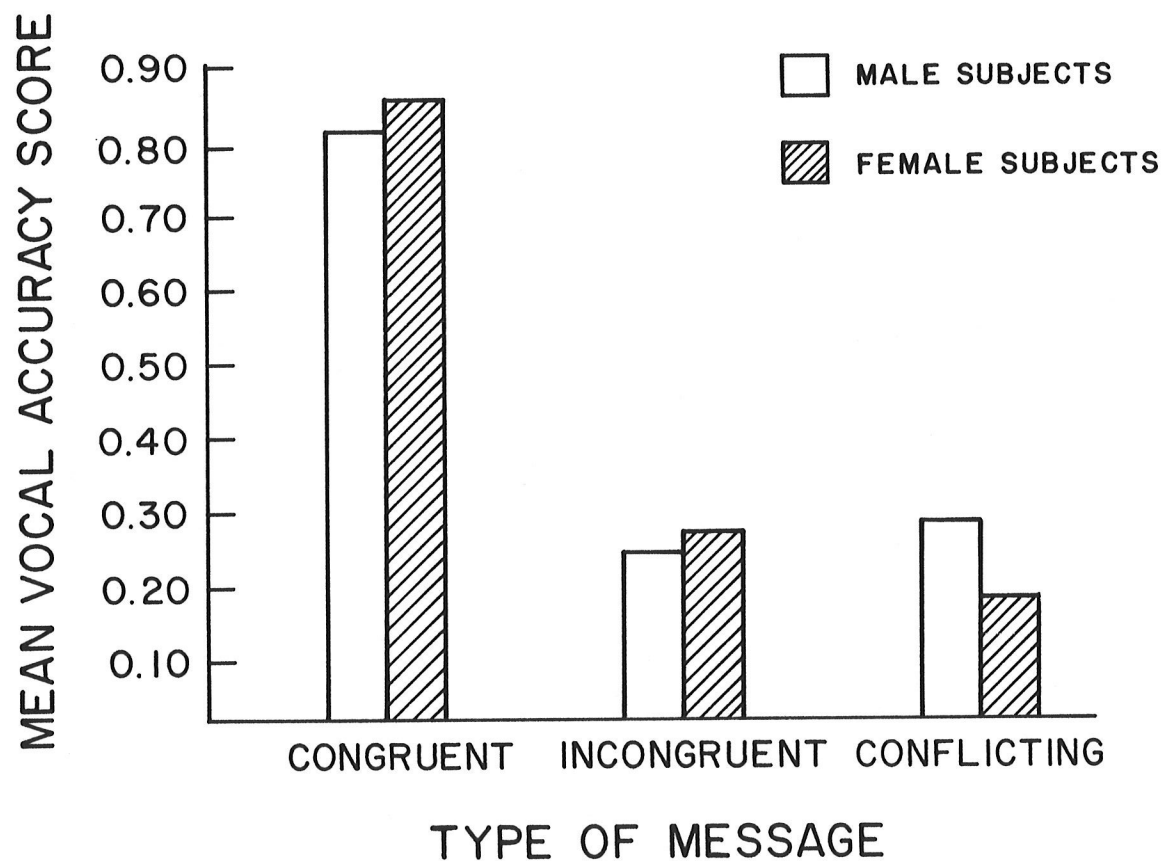
ration, a multivariate analysis of variance yielded a significant main effect for sex of speaker (Multivariate $F(24,81)=4.43$, $p<.001$). Any interpretation of this test result must be made with care since an attempt was made in the design to remove the effect of speaker sex.

Effect of Type of Message and Sex of Subject on Accuracy of Discrimination

Group means associated with accuracy of discrimination for each type of message for male and female subjects are graphically represented in Figure 2. Figure 2 suggests that female subjects discriminated congruent and incongruent messages more accurately than male subjects, while conflicting messages were discriminated more accurately by male subjects. In corroboration, a significant multivariate sex of subject by type of message interaction was found (Multivariate $F(3,102)=4.32$, $p<.01$).

A further analysis indicated that only the conflicting messages were affected significantly by subject sex ($F(1,104)=10.98$, $p<.001$). Sex of subject had no significant effect for congruent messages ($F(1,104)=.02$, $p<.89$) or incongruent messages ($F(1,104)=.48$, $p<.49$). These findings indicated that male and female subjects discriminated congruent and incongruent messages equally well, but that female subjects discriminated conflicting messages less accurately than male subjects.

Figure 2: Mean accuracy score as a function of type of message and sex of subject in the vocal channel



Nonsignificant Sex Effects and Higher Order Interactions

Let us now consider briefly other non-significant sex effects and their higher order interactions. These results are presented as an adjunct to the main results and are not discussed in detail.

The following effects were not significant and are not discussed further: sex of subject, the anxiety by sex of speaker interaction, the type of message by sex of speaker interaction, the anxiety by type of message by sex of speaker interaction, the anxiety by sex of subject interaction, the type of message by anxiety by sex of subject interaction, and the type of message by anxiety by sex of speaker by sex of subject interaction. For numerical details, see Table 1.

Accuracy of Discrimination in the Verbal Channel

Recall that the number of correct judgements for each of the vocal-verbal pairs of emotions was obtained for the 116 subjects in a manner identical to that followed for the vocal channel with one exception: a score of one was given if the verbally identified emotion had been identified correctly. A $3(\text{anxiety}) \times 3(\text{type of message}) \times 2(\text{sex of speaker}) \times 2(\text{sex of subject})$ multivariate analysis of variance (MANOVA) was conducted on accuracy of discrimination data within the verbal channel for each of the 25 vocal-verbal

messages. Since no problem of linearity occurred, all 25 messages were included in the analysis. An alpha level=.10 was used for the multivariate test statistic due to the conservative nature of the analysis(Hummel & Sligo, 1971). The results are summarized in Table 3.

TABLE 3

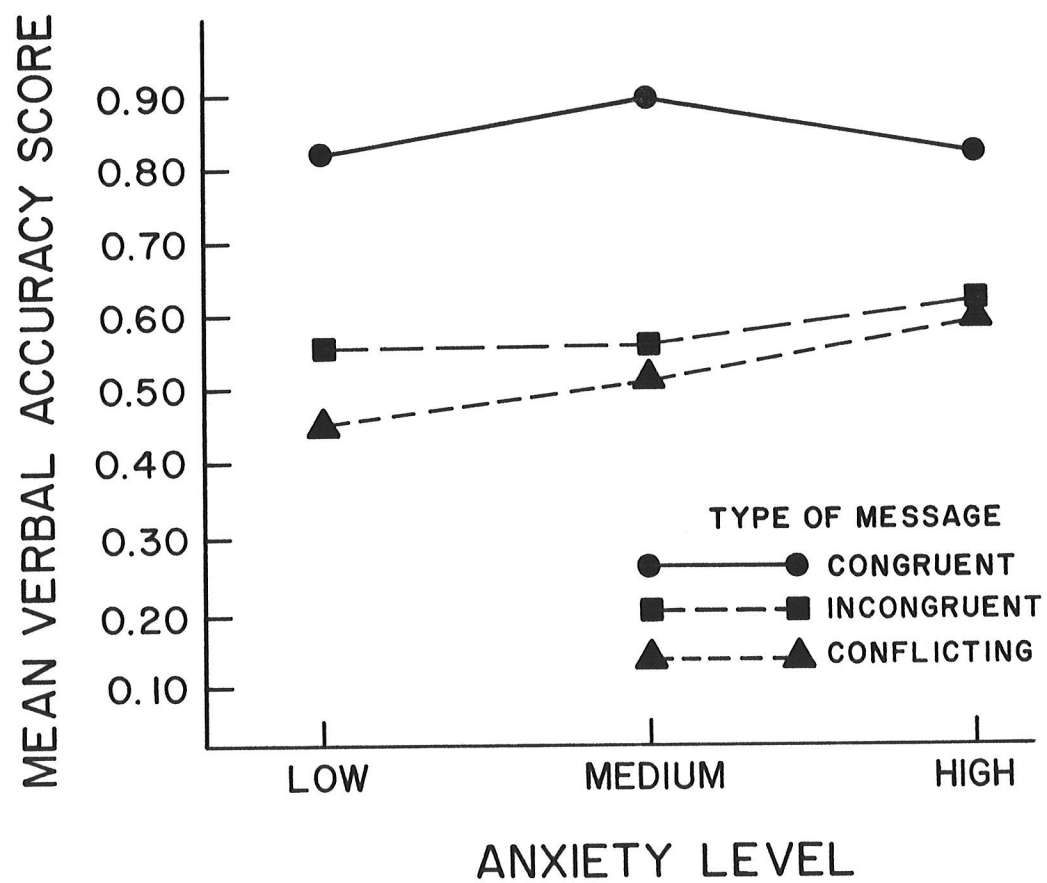
Summary of Multivariate Analysis of Variance for
Discrimination Ability in the Verbal Channel

<u>Source</u>	<u>df</u>	<u>F</u>	<u>p</u>
Anxiety (Anx)	50,160	1.17	<.24
Type of Message (Msg)	3,102	1051.43	<.0001
Sex of Speaker (Spkr)	25,80	4.33	<.0001
Sex of Subject (Subj)	25,80	.71	<.84
Anx x Msg	6,204	2.32	<.03
Msg x Spkr	3,102	2.34	<.08
Msg x Subj	3,102	.37	<.77
Anx x Spkr	50,160	1.30	<.11
Anx x Subj	50,160	1.36	<.08
Spkr x Subj	25,80	.92	<.58
Anx x Spkr x Subj	50,160	1.27	<.13
Msg x Spkr x Subj	3,102	.81	<.49
Anx x Msg x Spkr	6,204	1.77	<.11
Anx x Msg x Subj	6,204	3.76	<.002
Anx x Msg x Spkr x Subj	6,204	2.29	<.04

Effect of Anxiety on Discrimination Ability

Recall the prediction that anxiety would interfere with accuracy of discrimination, causing more anxious subjects to discriminate multiple emotional messages less accurately than less anxious subjects. While the results obtained for the vocal channel supported this prediction, Figure 3 suggests a marginally opposite effect for the verbal channel, with discrimination improving very slightly with increasing anxiety. The means were in fact .63, .66, and .78 for low, moderate, and high anxiety, respectively. Unlike the results for the vocal channel, however, the analysis indicated that anxiety had no significant effect on accuracy of discrimination in the verbal channel (Multivariate $F(50,160)=1.17$, $p<.24$).

Figure 3: Mean accuracy score as a function of anxiety and type of message in the verbal channel



Effect of Type of Message on Discrimination Ability

Recall the prediction that discrimination for congruent messages would be most accurate, for incongruent, less accurate, and for conflicting messages, the least accurate. Inspection of Figure 3 suggests that this prediction was supported. Means were .84 for congruent messages, .57 for incongruent messages, and .53 for conflicting messages. In corroboration the analysis revealed a significant multivariate effect for type of message (Multivariate $F(3,102)=1051.43$, $p<.001$).

In order to determine which messages were significantly different with respect to accuracy of discrimination, a further multivariate analysis was conducted on specific type of message contrasts. As for the vocal channel, the first contrast was designed to examine the difference between congruent minus noncongruent messages, while the second contrast was designed to examine the difference between conflicting minus incongruent messages. Significant effects were obtained for the congruent - noncongruent contrast ($F(1,104)=194.92$, $p<.001$), and for the conflicting - incongruent contrast ($F(1,104)=27.14$, $p<.001$). The tests showed that congruent messages were discriminated more accurately than were noncongruent messages, and that incongruent messages were discriminated more accurately than conflicting messages. A summary of the analysis is presented in Table 4.

TABLE 4

Summary of Multivariate Analysis of Variance for Differences
Between Type of Message Contrasts in the Verbal Channel

<u>Source</u>	<u>df</u>	<u>F</u>	<u>p</u>
Anxiety (Anx)	50,160	1.17	<.24
Type of Message (Msg)	2,103	102.13	<.0001
Sex of Speaker (Spkr)	25,80	4.33	<.001
Sex of Subject (Subj)	25,80	.71	<.84
Anx x Msg	4,206	1.93	<.11
Msg x Spkr	2,103	10.58	<.001
Msg x Subj	2,103	.37	<.69
Anx x Spkr	50,160	1.30	<.11
Anx x Subj	50,160	1.36	<.08
Spkr x Subj	25,80	.92	<.58
Anx x Spkr x Subj	50,160	1.27	<.13
Msg x Spkr x Subj	2,103	.98	<.38
Anx x Msg x Spkr	4,206	2.43	<.05
Anx x Msg x Subj	4,206	4.89	<.001
Anx x Msg x Spkr x Subj	4,206	3.88	<.01

Effect of Anxiety Level and Type of Message on
Discrimination Ability

As for the vocal channel, it was predicted not only that there would be anxiety and message effects as outlined previously, but also that the interaction of anxiety and type of message would affect discrimination as follows: as anxiety level increased, accuracy of discrimination would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages. Although a significant anxiety by type of message interaction was found (Multivariate $F(6,204)=2.32$, $p<.03$), inspection of Figure 3 suggests a different pattern than predicted. Congruent messages appeared to be discriminated most accurately at all levels of anxiety. At low and moderate levels of anxiety incongruent messages appeared to be discriminated more accurately than were conflicting messages. At the high level of anxiety, it appeared that both these types of messages were discriminated equally well. Two subsequent analyses were used to probe the interaction further.

First, exploration of the components of the interaction was undertaken. The analysis yielded a significant multivariate effect for low versus moderate anxiety collapsed across type of message (Multivariate $F(3,102)=2.70$, $p<.05$). The comparison of low versus high anxiety across type of message was not significant (Multivariate $F(3,102)=1.24$,

$p < .28$) nor was the comparison of moderate versus high anxiety across type of message (Multivariate $F(3,102)=1.33$, $p < .27$). These tests indicated that collapsed across type of message, accuracy of discrimination improved greatly as anxiety increased from low to moderate levels, while accuracy of discrimination improved only marginally from moderate to high levels.

Secondly, the data were further analyzed in order to determine the effect of anxiety on each type of message. The analysis yielded no significant univariate effect for type of message. In other words, discrimination of each type of message was virtually unaffected as anxiety increased from low to high levels.

The question remains, however, of accounting for the significant interaction effect. Inspection of Figure 3 suggests a possible explanation. It would appear that the trend or pattern of scores produced by the message types was different. Specifically, there seemed to be a difference in the linear or quadratic trend for the congruent versus the incongruent and conflicting messages, and no difference in the linear or quadratic trend between the incongruent and conflicting messages. In corroboration, an analysis yielded a significant difference between the congruent and incongruent messages with respect to both a linear trend ($t(115)=2.08$, $p < .05$) as well as a quadratic trend

($t(115)=6.25$, $p<.001$). The comparison between the congruent messages and conflicting messages was also found to be significantly different for the linear trend ($t(115)=27.81$, $p<.001$), and for the quadratic trend ($t(115)=8.21$, $p<.001$). The linear trend for incongruent and for the conflicting messages was not significant, indicating similar performance for these messages ($t(115)=1.60$, $p<.20$). The quadratic trend also was not significant ($t(115)=.20$, $p>.20$).

Differences for the trends among the three types of messages thus accounted for the significant interaction. It seems doubtful that these differences in trends are substantive and can supply a meaningful explanation of the data. Also as noted above, the univariate analysis showed that each type of message was virtually unaffected by anxiety, and this seems to be the most reasonable statistical inference to draw about the data.

Effect of Speaker Sex on Accuracy of Discrimination

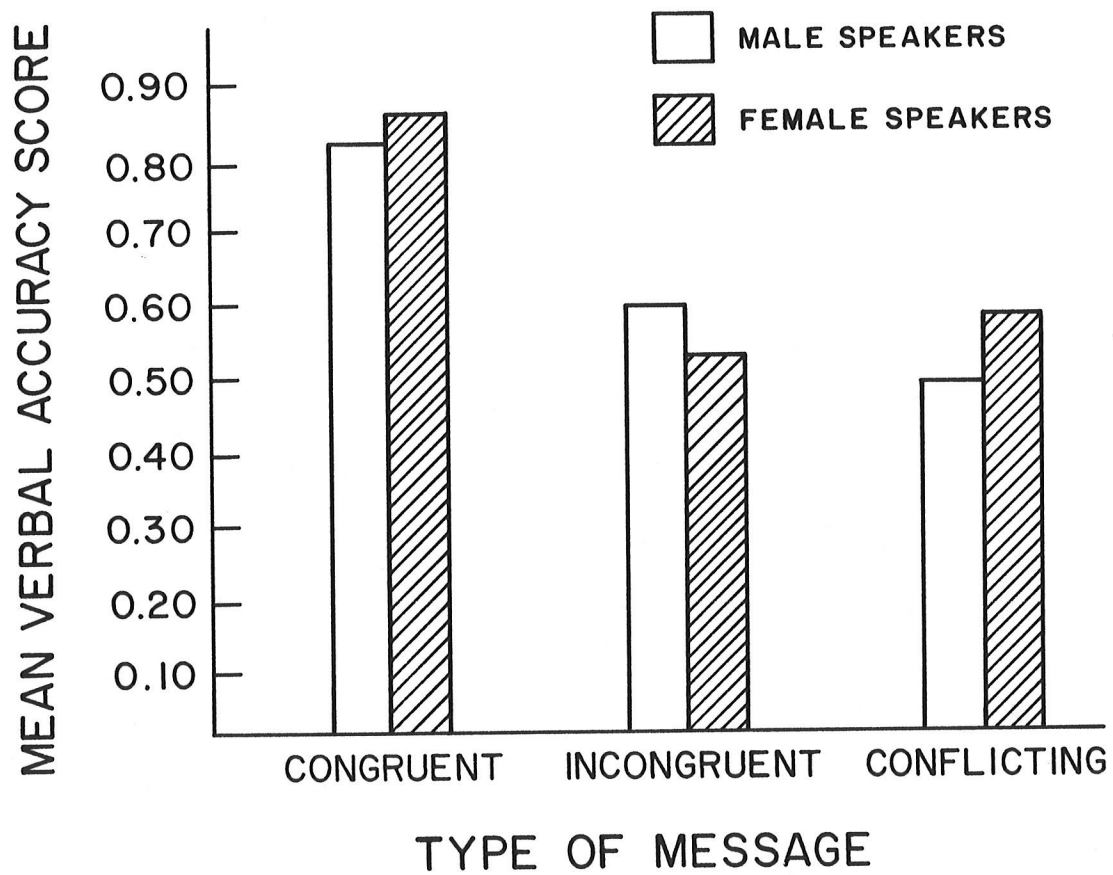
Group means associated with subjects' responses to male and female speakers were .65 and .61, respectively, suggesting that emotional messages presented in the verbal channel were discriminated more accurately when the speakers were male. In corroboration, a significant multivariate main effect for speaker sex was found (Multivariate $F(25,80)=4.33$, $p<.001$). Since an attempt was made to remove speaker effects, any interpretation of the sex of speaker effect should be made with caution.

Effect of Type of Message and Sex of Speaker on Accuracy of Discrimination

Group means associated with each type of message for both male and female speakers are graphically presented in Figure 4. Inspection of Figure 4 suggests that congruent and conflicting messages were discriminated somewhat better by subjects responding to female speakers, while incongruent messages were discriminated more accurately by subjects responding to male speakers. In general corroboration, a significant multivariate sex of speaker by type of messages interaction was found (Multivariate $F(3,102)=2.34$, $p<.08$).

Multiple post hoc comparisons were used to test the discrimination ability of subjects responding to male and female speakers for each type of message (Tukey, 1953). The level of significance was set at $\alpha = .01$ for each comparison. The only significant comparison occurred for conflicting messages, indicating that subjects responding to female speakers discriminated conflicting messages more accurately than subjects responding to male speakers, but that the sex of speaker did not affect the accuracy of discrimination for congruent or incongruent messages.

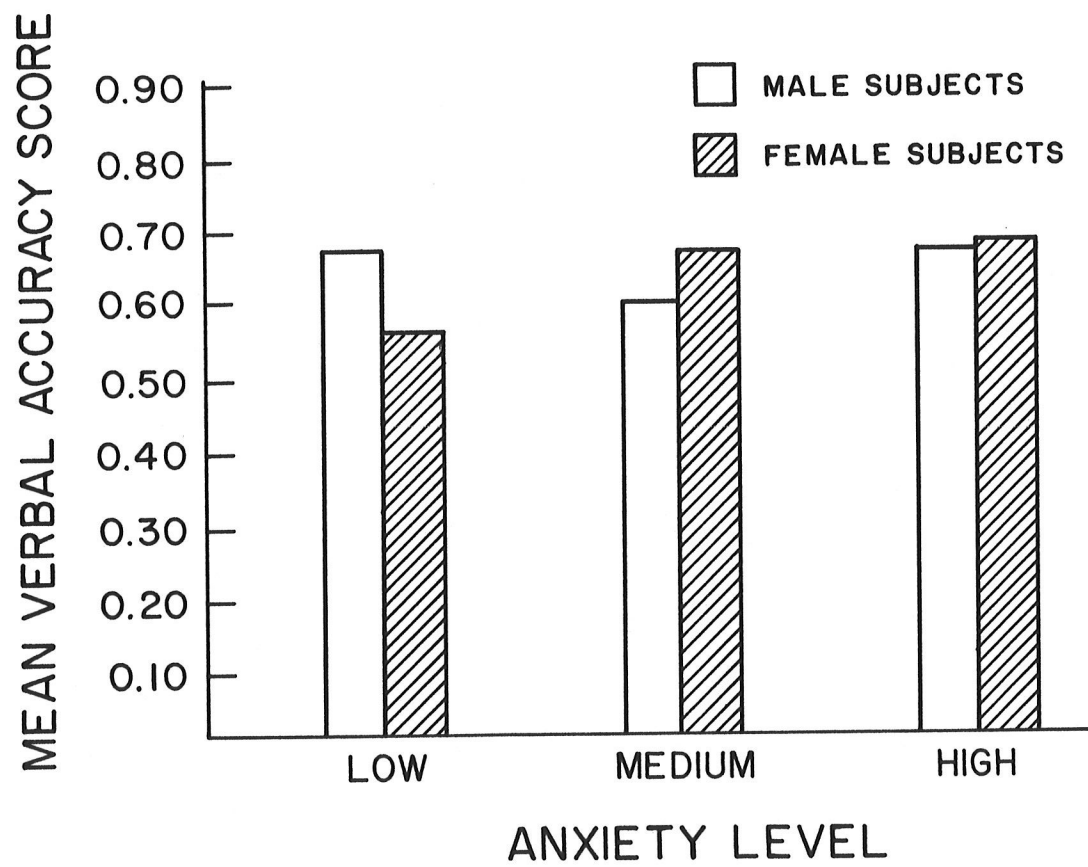
Figure 4: Mean accuracy score as a function of type of message and sex of speaker in the verbal channel



Effect of Anxiety Level and Subject Sex on Accuracy of Discrimination

Group means associated with accuracy of discrimination for male and female subjects at each level of anxiety are graphically presented in Figure 5 in the form of a bar graph rather than a line graph for greater clarity. It would appear from inspection of Figure 5 that at the low level of anxiety, male subjects discriminated emotional messages more accurately than female subjects, while at moderate and high levels of anxiety, female subjects discriminated emotional messages more accurately than did male subjects. In overall support, a significant interaction was found for anxiety and sex of subject (Multivariate $F(50,160)=1.36$, $p<.08$). Further analysis showed no significant effect for low versus moderate anxiety and subject sex (Multivariate $F(25,80)=1.29$, $p<.20$) or low versus high anxiety and subject sex (Multivariate $F(25,80)=1.34$, $p<.16$), indicating similar performance among the groups. However, the analysis yielded a significant multivariate effect for moderate versus high anxiety and sex of subject (Multivariate $F(25,80)=1.70$, $p<.04$). Thus, the performance of male and female subjects at low and high levels of anxiety was similar, but female subjects performed better than males at moderate levels.

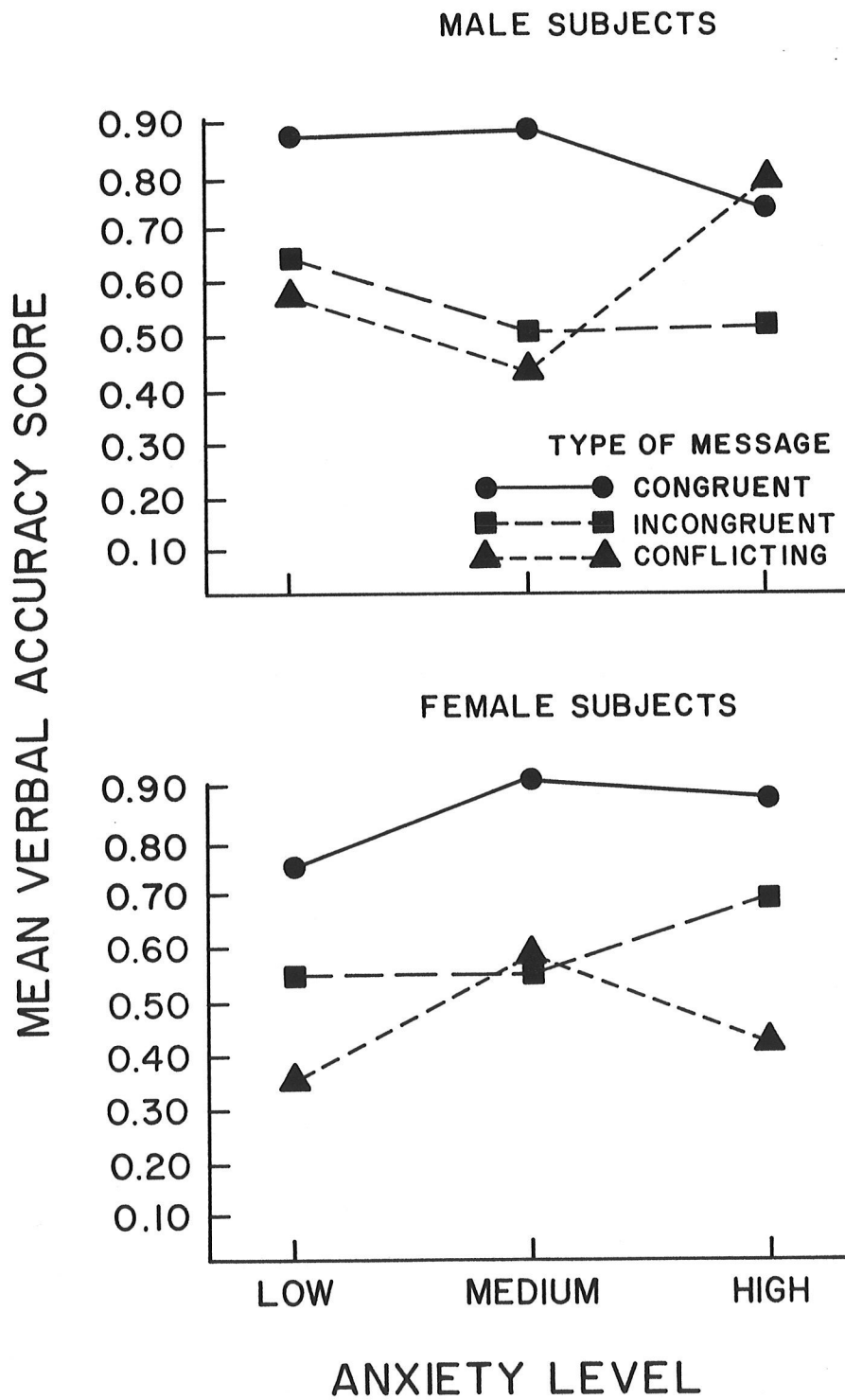
Figure 5: Mean accuracy score as a function of anxiety level and sex of subject in the verbal channel



Effect of Anxiety, Type of Message, and Sex of Subject on Accuracy of Discrimination

Group means associated with each level of anxiety for male and female subjects for each type of message are presented graphically in Figure 6. Although the interaction of anxiety, type of message, and sex of subject was significant (Multivariate $F(6,204)=3.76$, $p<.01$), this effect was complex. For example, it would appear from inspection of Figure 6 that a U shaped function was produced by male subjects for conflicting messages across the anxiety variable, while an inverted U shaped function was produced by female subjects. Furthermore, high anxious male subjects seemed to discriminate conflicting messages more accurately than congruent messages. Such effects would be difficult to interpret. Moreover, one of the data points was based solely on one observation in that cell. Accordingly, this interaction is not discussed further.

Figure 6: Mean accuracy score as a function of anxiety level type of message and sex of subject in the verbal channel



Effect of Anxiety, Type of Message, Sex of Speaker, and
Sex of Subject on Accuracy of Discrimination

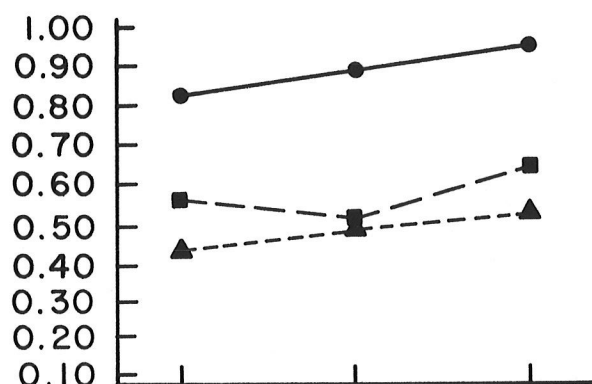
Group means associated with male and female speakers and male and female subjects at each level of anxiety for each type of message are presented graphically in Figure 7. While the four way interaction was significant (Multivariate $F(6,204)=2.28$, $p<.04$) this effect was complex. For example, a U-shaped function occurred for male subjects responding to male speakers for some messages, while an inverted U-shaped function occurred for female subjects responding to male speakers for the same messages. Moreover, it would seem that the performance of male subjects responding to male speakers was somewhat similar to the performance of female subjects responding to female speakers. Such effects would be difficult to interpret, and accordingly are not discussed further.

Figure 7: Mean accuracy score as a function of anxiety, type of message, sex of speaker and sex of subject in the verbal channel

MEAN VERBAL ACCURACY SCORE

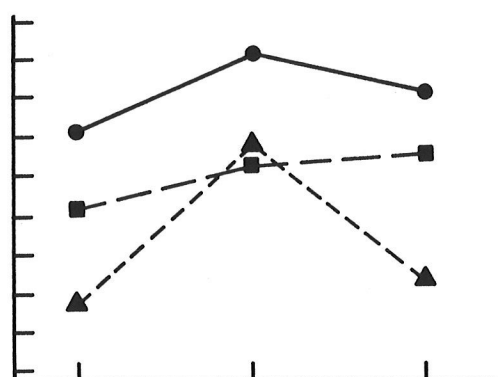
FEMALE SPEAKERS

FEMALE SUBJECTS

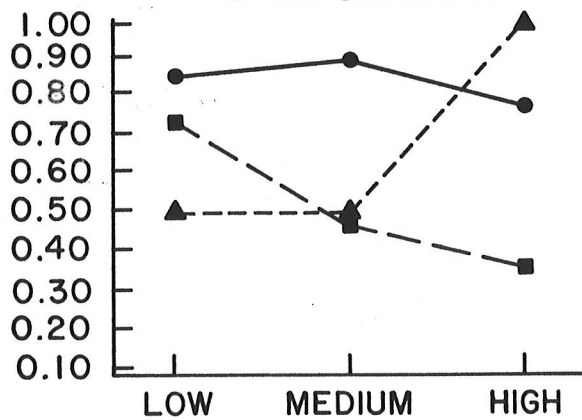


MALE SPEAKERS

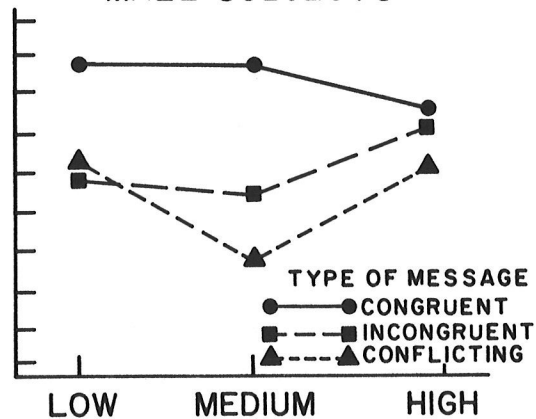
FEMALE SUBJECTS



MALE SUBJECTS



MALE SUBJECTS



TYPE OF MESSAGE
●—● CONGRUENT
■—■ INCONGRUENT
▲—▲ CONFLICTING

ANXIETY LEVEL

ANXIETY LEVEL

Nonsignificant Sex Effects and Higher Order Interactions

The following effects were not significant and are not discussed further: sex of subject, the message by subject interaction, the anxiety by speaker interaction, the speaker by subject interaction, the anxiety by speaker by subject interaction, the type of message by speaker by subject interaction, and the anxiety by type of message by sex of subject interaction. For numerical details see Table 3.

It should be iterated here that four cells of the design contained four subjects or less. Thus, any interpretation of higher order interactions should be made with caution. The reader is referred to appendixes F and G for numerical details concerning cell sizes, means, and standard deviations for the vocal and the verbal channels respectively.

DISCUSSION

The major objective of the present study was to demonstrate the effect of three levels of anxiety on childrens' ability to discriminate multiple emotional messages in the vocal and the verbal channels. Although some research has indicated that anxiety facilitates performance on particular tasks (e.g., Ruebush, 1960), the bulk of the literature shows that anxiety disrupts it for most tasks (e.g., Merryman, 1974; Meuller, 1976). Both the Cognitive Social Learning interpretation of anxiety, and the Response Competition and Information Processing model of anxiety, suggest that anxiety can be viewed as an irrelevant cognitive event which competes with relevant task-related information.

According to the Cognitive Social Learning Theory of anxiety, the cognitive component of anxiety (i.e., worry) involves conscious concern about one's performance and its consequences, that is, negative task expectations and negative self-evaluations (Sarason, 1975). The highly anxious individual seems to attend to his own internal cues rather than relevant environmental cues, thus performing poorly.

The Response Competition and Information Processing Model of anxiety suggests that irrelevant cognitive events (i.e., anxiety) compete with task-relevant information. Both types of information must be processed, but since the organism's capacity is limited, for an anxious subject, in-

terference occurs, again producing poor performance (Hamilton, 1975).

The bulk of the studies reviewed in the Introduction conform to the predictions of at least one of these theories. However, data on the effects of anxiety on communication skills in children are limited. It was thus hoped that the present study would also shed light on the effect of anxiety on discrimination of particular types of multiple messages (namely, congruent, incongruent, and conflicting), and would support the overall predictions (1) that more anxious children would discriminate multiple emotional messages less accurately than less anxious children; (2) that congruent messages would be discriminated most accurately, incongruent messages discriminated less accurately, and conflicting messages the least accurately; and finally (3) that as anxiety increased, discrimination ability would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages.

In the present study, it will be recalled, low, moderate, and high anxious male and female grade four children were presented with 25 multiple emotional messages. Happy, sad, angry, loving, and neutral statements were expressed by male and female speakers in a happy, sad, angry, loving, or neutral tone of voice. The subjects were asked to indicate how the speaker felt for each of the verbal (content) and the vocal (affect) channels. For discrimination, a score of

one was given if the subject accurately chose the intended emotion presented in the the vocal channel, or a score of one if the subject chose the intended emotion in the verbal channel.

Recall that in previous research, relationships have been found between anxiety and defensiveness, anxiety and intelligence, and intelligence and discrimination ability. In order to determine whether defensiveness and intelligence impacted upon the major variables of concern, a number of correlations were computed. The results of the correlations indicated no significant relationship among these variables in the verbal and vocal channels. Because the correlations were trivial, it was reasonable to conclude that the data were free from any artifacts due to the intrusion of these extraneous variables. The major findings of interest can now be discussed in and of themselves. Results for accuracy of discrimination are discussed for the vocal channel and then for the verbal channel. The discussion of accuracy of discrimination will focus primarily on effects for anxiety, type of message, and the interaction of anxiety and type of message. Other significant effects are then discussed. Comparisons between the vocal and the verbal channels are made throughout the discussion where appropriate.

Discrimination in the Vocal Channel

Hypothesis one was that high anxious children would be less accurate than low anxious children in their ability to discriminate multiple emotional messages. Results of the present study supported this prediction. That is, highly anxious subjects discriminated multiple emotional messages less accurately than low anxious subjects. This result is consistent with anxiety theory and the bulk of the research showing the disruptive effects of anxiety on a variety of tasks such as paired associate learning (Goulet & Mazzei, 1969; Verma & Nijhawan, 1976), reading ability (Merryman, 1974), short term memory (Hodges & Spielberger, 1969), and free recall (Meuller, 1976).

The moderate and high anxious groups discriminated multiple emotional messages equally well. Two possible explanations for this effect are as follows: First, the discrimination measure utilized may have been relatively insensitive at the moderate to high end of the anxiety scale and thus not detected differences that would have been found for some other task. Or second, the ranges used to assign subjects to anxiety levels may have yielded a smaller difference between the moderate and high groups than between the low and moderate group. This could have resulted in a failure to detect differences in discrimination for the former two groups. Whatever the case, the lack of a difference in the moderate and high groups need not be of major concern: the first hypothesis was essentially supported.

Hypothesis two was that subjects would discriminate congruent messages most accurately, incongruent messages less accurately, and conflicting messages the least accurately. Results from the present study partially supported this hypothesis. That is, congruent messages were in fact discriminated the most accurately. Incongruent and conflicting messages were discriminated equally well, but less well than congruent messages. The fact that congruent messages were discriminated more accurately than noncongruent messages is consistent with other data in the field. For example, Butchard (1983) found that children discriminated congruent messages more accurately than noncongruent messages. In a similar vein, Mehrabian (1970) found that subjects "preferred" congruent messages to noncongruent messages. As was suggested previously, since similar or congruent messages present consistent information in the vocal and verbal channels, they do not tax the subjects' processing capacity and allow good discrimination. However, noncongruent messages present dissimilar information in the two channels which reduce the subjects' capacity to process all the information and thus interfere with discrimination.

The similarity of effect for incongruent and conflicting messages warrants further comment. From a theoretical perspective, incongruent and conflicting messages are less clearly defined than congruent messages. Thus, these messages present competing information to the subjects which nevertheless must be processed. The more ambiguous the mes-

sages the greater the burden placed on the individual's capacity to process all the information. It would seem logical then that these messages would be less easily discriminated than congruent messages. Theoretically, it can also be argued that because conflicting messages consist of two emotions which are opposite in nature, while incongruent messages consist of two emotions which are different but not opposite, the conflicting messages would be more ambiguous and hence more difficult to discriminate. To put this notion in slightly different terms, the more dissimilar messages in two channels become, the greater the informational load placed on the individual's processing capacity and the more discrimination ability is reduced.

Recall that Butchard (1983) performed a study similar to the present one in which male and female subjects of differing ages were presented with the verbal-vocal stimuli utilized in the present study. In support of the predictions here, but in contrast to the present results, he found that incongruent messages were discriminated more accurately than were conflicting messages.

A possible explanation for incongruent and conflicting messages being discriminated equally well in the present study may be related to the credibility of the vocal stimuli. It is quite possible that in the present study the subjects found the vocal (affective) stimuli for the incongruent and conflicting messages so humorous that they disregarded the information presented in that channel. In

the Butchard (1983) study cited above, it was reported that when one child in a group laughed at incongruent messages the other children would copy him or her. It was concluded that a "fun" atmosphere may have existed which could have encouraged the children to think that some of the messages were intended to be funny. This explanation is supported indirectly by the observation that in the present study, groups of children would tend to laugh when presented with incongruent and conflicting messages. As well, the atmosphere of the experiment was structured so as to provide a relaxed, non-threatening environment. It is quite possible, then, that the atmosphere amused and relaxed the subjects, and enhanced their ability to perceive incongruent and conflicting messages as humorous, with the result that accuracy of discrimination for these messages in the present study was similar.

Hypothesis three was that as anxiety level increased, discrimination ability would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages. Results of the present study again partially supported this hypothesis. Subjects' ability to discriminate congruent and incongruent messages was not significantly affected as anxiety level increased. Discrimination of congruent messages was high at all levels of anxiety, as predicted. Discrimination of incongruent messages was low at all levels

of anxiety, contrary to prediction. Perhaps this effect occurred for one or two reasons or a combination of both. First, the distress produced by the ambiguity of incongruent messages may have been too mild to interact with anxiety and affect discrimination. Second, the relaxed, fun-like atmosphere of the experimental situation may have reduced anxiety to the extent that the distressing effect of incongruent messages on discrimination was unaffected as anxiety level increased.

For conflicting messages, accuracy of discrimination was moderate at the low level of anxiety, and sank to very low levels as anxiety increased. This latter result is not inconsistent with anxiety theory, which predicts that performance will be disrupted at a high level of anxiety. Moreover, this result is consistent with the limited number of studies examining multiple message communication reviewed in the Introduction.

Post hoc comparisons indicated that conflicting messages were discriminated more accurately than incongruent messages at the low level of anxiety, and less accurately at the moderate and high levels. The question remains of accounting for this effect. One possible explanation for moderate accuracy for conflicting messages at the low anxiety level is that the anxiety-provoking nature of the conflicting messages (e.g., Smith, 1976; Ironhill, 1977), was minimized and in fact overridden by their humorous quality.

However, as anxiety level increased, the anxiety-provoking nature of the conflicting messages also increased. Simultaneously the levity induced by the humorous quality of the conflicting messages decreased. As a result, accuracy of discrimination of these messages declined. That is, highly anxious subjects tended to respond even more adversely (i.e., became less accurate) when they discriminated the conflicting messages as opposed to the incongruent messages, because although incongruent and conflicting messages were both ambiguous communications, conflicting messages became more ambiguous (i.e., less cognitively clear) as anxiety increased.

As has been suggested previously, the more dissimilar messages in two channels become, the more unclear or ambiguous they become and the more difficult to discriminate. The information processing deficit caused by the ambiguity of the mixed messages, in combination with the debilitating effects of anxiety, produced very strong interference with discrimination of multiple messages indeed.

Sex Effects

No hypotheses were generated with respect to sex effects as they were not of primary importance to the present study. However, since sex of speaker and the interaction of sex of subject and type of message were found to be significant, they are discussed briefly.

Results of the present study are consistent with other research in the area showing that females are better encoders than males (e.g., Dimitrovsky, 1964; Levy, 1964). The significant main effect for sex of speaker obtained in the present study should, however, be interpreted with caution. Recall that the vocal-verbal stimuli utilized in the present study were those used by Butchard (1983). They had been produced by four different male and female speakers, in an attempt to ensure that the idiosyncratic characteristics of the speakers did not generate differences between the way the speakers were perceived. Since the final vocal speech samples chosen were approximately matched for accuracy with which male and female speakers were perceived, it would seem unlikely that a significant sex of speaker effect would be obtained in the present study. It is difficult therefore to ascertain the exact reason for the significant sex of speaker effect. One possible explanation is that while accuracy of matching was attempted for the original messages portrayed by male and female speakers, precise matching of the speakers was not possible for all of the 25 stimuli. It might be, therefore, that the difference between male and female speakers was due to procedural artifacts rather than a true sex effect.

No hypothesis was generated with respect to the interaction of sex of subject and type of message. Results of the present study indicated that sex of subject had no sig-

nificant effect on accuracy of discrimination for congruent and incongruent messages. Male subjects, however, discriminated conflicting messages more accurately than did female subjects. Although some research shows that vocal information is important when resolving conflicting messages (Mehrabian & Wiener, 1967; Fujimoto, 1972), no research is available showing that males are generally better decoders than females.

A possible explanation for the obtained result may lie with males' propensity to be involved in conflicting types of communications. For example, Bugental, Love, Kaswan and April (1971), in a study examining the effects of verbal and nonverbal conflict in parental messages to normal and disturbed children, reported that 59% of the mothers of "disturbed" children produced conflicting messages, and 10% of the mothers of "normal" children produced such messages. Moreover, out of their total sample of "disturbed" children, the authors reported that 85% were males, and that 70% of the "normal" sample were males. The Bugental et al. (1971) study thus provides evidence that both disturbed and normal children are the recipients of at least some conflicting types of communication, and that males in the general population are subjected to conflicting communications. It was therefore quite possible that in the present study, the male subjects may have been exposed to and had greater experience with conflicting communications, and thus showed increased ability in their discrimination.

Summary

Results of the present study indicated that for the vocal channel, highly anxious children discriminated multiple emotional messages less accurately than low anxious children. This effect, which generally conformed to prediction, was discussed with reference to anxiety theory and data in the field. There was no difference found for moderate versus high anxiety on accuracy of discrimination. This was accounted for by the possible insensitivity of the discrimination measure at moderate and high levels of anxiety, or the small difference in anxiety level produced by the assigned ranges for the moderate and high groups.

Congruent messages were discriminated more accurately than were noncongruent messages (i.e., incongruent and conflicting messages). This effect also conformed to prediction, and was discussed with reference to the clarity of the congruent messages in contrast to the ambiguity of the noncongruent messages. No difference in accuracy of discrimination was found for the incongruent or conflicting messages. This effect was discussed with reference to the credibility of the information presented in the vocal channel.

In the present study it was also found that congruent messages were discriminated very accurately at all levels of anxiety, while incongruent messages were discriminated poor-

ly at all levels of anxiety. Conflicting messages were discriminated moderately well at the low level of anxiety, and very poorly at the moderate and high levels of anxiety. These effects, which partially supported predictions, were discussed with reference to theory and data, and with reference to the influence of the humorous and distressing quality of conflicting messages on discrimination at different levels of anxiety.

It was suggested that the significant sex of speaker effects obtained in the present study could as readily be accounted for by procedural artifacts as by sex itself. Also, it was found that while congruent and incongruent messages were discriminated equally well regardless of sex, male subjects discriminated conflicting messages more accurately than female subjects. It was suggested that male subjects' superior discrimination of conflicting messages was due to their greater experience with such messages.

Discrimination in the Verbal Channel

As for the vocal channel, Hypothesis 1 was that as anxiety level increased, accuracy of discrimination would decrease. This prediction was not supported. Accuracy of discrimination in the verbal channel was not affected by anxiety level, although accuracy was affected in the vocal channel. One possible explanation for this discrepancy between the verbal and the vocal channels is that the discrim-

ination task in the verbal channel was less complex than that in the vocal channel. A number of studies have indicated that young children make more use of the verbal channel than the vocal channel in discriminating multiple emotional messages (e.g., Solomon & Ali, 1972). Butchard (1983) also found that subjects made fewer errors in discriminating messages presented in the verbal channel as compared to the vocal channel. By way of support for this notion, it is interesting to observe that in the present study, the overall mean for accuracy of discrimination in the verbal channel was .63, while the mean for accuracy in the vocal channel was .39.

It is possible that since the task presented in the verbal channel may have been simpler than that presented in the vocal channel, and since the anxiety level of the moderate and high groups may have been reduced due to the fun-like atmosphere of the experimental situation, all the subjects performed similarly.

Such an explanation is not incompatible with the Response Competition and Information Processing Model of anxiety (Hamilton, 1975). Recall that in this model, anxiety is defined as irrelevant cognitive events which compete with task-relevant information. Both types of information must be processed, but since the organism's capacity is limited, interference occurs. In the present study, as suggested previously, the relaxed "game-like" atmosphere of the experimental situation may have reduced anxiety level for the

moderate and high groups to the extent that anxiety did not compete with task-relevant information. Since all anxiety groups were able to process the task-relevant information similarly, no effect of anxiety was found.

Hypothesis 2 was also identical to that generated for vocal accuracy. That is, congruent messages would be discriminated most accurately, incongruent messages less accurately and conflicting messages the least accurately. Results from the present study supported this hypothesis for verbal accuracy. This result is consistent with other research in the area (e.g., Mehrabian, 1970; Butchard, 1983).

Accuracy of discrimination for the incongruent and conflicting messages differed somewhat for the verbal and the vocal channels. Recall that for the vocal channel, incongruent and conflicting messages were discriminated equally well. In the verbal channel, however, the conflicting messages were discriminated less accurately than were the incongruent messages. A possible explanation for the discrepant results obtained for the two channels is that the level of credibility among the messages presented in the channels differed. That is, the subjects may have found the incongruent and conflicting messages presented in the vocal channel (i.e. affective channel) so humorous that they regarded them as less credible than those presented in the verbal channel (i.e., content channel). As a result, the subjects could have disregarded or discounted the information presented in the vocal channel. This argument is reinforced by a study

by Bugental (1974), in which it was found that when the speaker's voice was not credible, a greater emphasis was given to content rather than to intonation. Thus, the messages presented in the verbal channel were more credible, and subjects attended to the information presented in this channel more carefully. Since the congruent, incongruent, and conflicting messages varied from low to high in ambiguity, respectively, discrimination varied from good to poor, respectively.

This explanation appears unable to account for Butchard's results indicating that conflicting messages were discriminated more poorly than incongruent messages in both the verbal and the vocal channels. However, one possible explanation for the discrepancy between Butchard's (1983) results and the present ones may lie with the conceptualization of the three types of messages. In the Butchard study, incongruent messages consisted of pairings of emotions in the verbal and the vocal channel which were opposite in nature. These same types of messages were defined as conflicting in the present study. A second category of messages in the Butchard study consisted of pairings of particular emotions in one of the channels (e.g., vocal) with a neutral emotion in the other (verbal). A third category of messages consisted of emotions matched on an activity dimension, while a fourth category of messages consisted of emotions matched on a valence dimension. In the present study however, incongruent messages included all those messages which

Butchard matched on the activity dimension, those matched on the valence dimension, and those paired with the neutral emotion. The point is, then, that the differences in the results may have been a function of differences in the way that the data were categorized.

Hypothesis 3 for verbal accuracy was identical to that for vocal accuracy. That is, as anxiety increased, discrimination ability would decrease to a small extent for congruent messages, to a greater extent for incongruent messages, and to an even greater extent for conflicting messages in both channels. This prediction was not supported. Although it would appear from inspection of Figure 3 that accuracy of discrimination of the three types of messages was affected by an increase in anxiety level, univariate analyses indicated that there was no significant difference in performance for any messages as a function of anxiety. In order to account for the significant multivariate interaction, trend analyses were employed comparing the difference among the three types of messages across anxiety level. While the analysis indicated that there were significant differences among the trends, the implication of these differences is unclear. They do not seem to provide a meaningful way of interpreting the data. Given that the univariate analyses showed no effect of anxiety on discrimination for each type of message, it thus seems simpler and more reasonable to conclude that in the verbal channel, discrimination for any type of message was not affected by subjects' anxiety level.

The failure to find a significant anxiety by type of message effect may be accounted for by the fact that the task presented in the verbal channel was less complex than that presented in the vocal channel. Such an explanation is consistent with the Response Competition and Information Processing Model of anxiety (Hamilton, 1975) and data in the field regarding the anxiety-provoking nature of conflicting messages (Smith, 1976; Ironhill, 1977). The fact that the discrimination task in the verbal channel was simple meant that anxiety, (defined as irrelevant cognitive events), did not compete with the task-relevant information. Moreover, given the fun-like atmosphere of the experimental situation and the humorous quality of the conflicting messages themselves, it may have been that the anxiety-provoking nature of these messages was overridden. As a consequence, all messages were discriminated equally well.

Sex Effects

No hypotheses were generated with respect to accuracy of discrimination as a function of sex. Results of the present study indicated that subjects discriminated messages presented in the verbal channel more accurately when the speakers were male. This effect was the reverse for the vocal channel, which indicated that females were better encoders than males. There does not seem to be any evidence available which indicates that males are better encoders than females. The caution stated previously with respect to

the interpretation of sex effects in the vocal channel, therefore, may likewise apply to the verbal channel. That is, the difference in discrimination of male and female speakers may have been due to procedural artifacts caused by imprecise matching of some of the verbal-vocal stimuli rather than sex itself.

The results also indicated that not all of the messages were responsible for the apparent overall encoder superiority of the male speakers. That is, there was no significant difference in the subjects' ability to discriminate congruent or incongruent messages as a function of speaker sex. However, female speakers were perceived more accurately than were male speakers when the messages were conflicting, despite the fact that both male and female speakers spoke the same words. Exactly why conflicting messages were discriminated more accurately when spoken by female speakers is unclear. It is possible that the result was a procedural artifact like that suggested for the main effect of sex of speaker. If the effect was substantive, however, studies by Baekel and Mehrabian (1969) and Bugental et al. (1971), may shed some light on it.

Baekel and Mehrabian (1969) examined the relationship between psychopathology in adolescents and parental evaluative incongruence in verbal and postural communication components. They found that mothers of "disturbed" children communicated more conflicting messages than did fathers of "disturbed" children. Recall that Bugental et al. (1971)

found that 59% of the mothers of "disturbed" children communicated conflicting messages, and 10% of the mothers of "normal" children communicated such messages. In the Bugental et al. (1971) study, it was found that the typical conflicting message contained a critical or disapproving statement spoken in a positive tone of voice. These studies taken together thus suggest that females generally tend to emit more conflicting types of messages than do males, and hence that children receive a greater exposure to and experience with such messages. Such experience would account for the greater accuracy of discrimination for conflicting messages emitted by females in the present study.

While no significant effect of sex of subject on verbal accuracy was found in the present research, a significant anxiety by sex of subject interaction was obtained. At moderate levels of anxiety, for example, female subjects discriminated emotional messages more accurately than did male subjects. At low and high levels of anxiety, however, male and female subjects discriminated emotional messages equally well. Although a number of investigators have reported that females are better decoders than males, especially in the vocal channel (e.g., Dimitrovsky, 1964; Zuckerman et al., 1975), no information is available on the effect of sex of subject on accuracy of discrimination in the verbal channel. The results of the present study suggest that accuracy of discrimination in the verbal channel is not a simple function of gender. Personality variables such as level of

anxiety are important factors which must be taken into consideration in the discrimination of multiple emotional messages. A clear account of how these variables interact with sex to affect discrimination is, however, not possible in the present research.

Summary

Accuracy of discrimination in the verbal channel was not affected by anxiety level, although such an affect was predicted. In the vocal channel however, high levels of anxiety were found to disrupt performance. This discrepancy was discussed in terms of theories related to the interference effects of anxiety.

The present study showed that as predicted, in the verbal channel, congruent messages were discriminated the most accurately, incongruent messages were discriminated less accurately, and conflicting messages were discriminated the least accurately. These results, which were slightly different from results in the vocal channel, were discussed in terms of the credibility of the communication presented in the vocal and verbal channels, and theory and data in the field.

A significant anxiety by type of message interaction was attributed to differences in trends as a function of anxiety. It was suggested that these differences provided no meaningful account of the data. Inference from univari-

ate analyses suggested that discrimination for any type of message was not affected by anxiety level. This effect was discussed with reference to the anxiety reducing atmosphere of the experimental situation, the overriding quality of the humorous nature of the conflicting messages, and theory and data in the field.

Accuracy of discrimination was superior for subjects responding to male subjects in the verbal channel. This effect, it was suggested, could as easily have been due to procedural artifacts related to imprecise matching of the verbal-vocal stimuli, as it could have been to sex itself.

A significant type of message by sex of speaker interaction was also found. Congruent and incongruent messages were discriminated equally well regardless of speaker sex. Conflicting messages were discriminated more accurately for female than male speakers. This effect, it was suggested, occurred because females generate more conflicting messages than do males. Hence, children would have more experience with such messages, and be able to discriminate them more accurately.

A significant anxiety by sex of subject interaction was also found for verbal accuracy. At moderate levels of anxiety, female subjects performed better than male subjects, while at low and high levels of anxiety, their performance was similar. It was suggested that accuracy of discrimination in the verbal channel was not a simple function of gen-

der and that personality factors are important variables which must be taken into account.

Summary and Some Conclusions

It was predicted that as anxiety level increased, accuracy of discrimination would decrease in both the vocal and verbal channels. This prediction was not supported for the verbal channel, where it was found that discrimination was not affected by anxiety level. It was, however, essentially supported for the vocal channel. Discrimination ability there was good at the low level of anxiety, and poor but similar at the moderate and the high levels. There are two possible explanations for similarity in performance at the moderate and high levels. First, the discrimination task may have been insensitive at the middle to upper end of the anxiety scale. Second, the ranges used to assign subjects to anxiety levels may have yielded small group differences at the higher end of the anxiety scale.

The overall detrimental effect of anxiety found for vocal accuracy in the present study is consistent with both the Cognitive Social Learning Theory of Anxiety as well as the Response Competition and Information Processing Capacity Model of Anxiety, and data in the field discussed previously. The theories and data available also suggest that the occurrence of anxiety effects may depend on the complexity of the task involved. This may explain why there was an ef-

fect for the vocal but not for the verbal channel in the present study. Results obtained by Butchard (1983), as well as the present ones, showed that subjects made fewer discrimination errors in the verbal channel as compared to the vocal channel. It would thus appear that the verbal channel contained a relatively simple task which did not interact with anxiety, while the vocal channel contained a difficult one which did. Results for the vocal channel also suggest that its importance cannot be underestimated for anxious children. That is, tone of voice may have serious negative effects on children predisposed toward maladaptive behavior. This point is considered more extensively later.

One further comment with respect to the anxiety effect itself is worth mentioning. Recall from the Introduction that there are two distinct forms of anxiety, namely, state and trait. While state anxiety is a transitory emotional condition that may fluctuate over time and is evoked in individuals who interpret specific situations as personally threatening, trait anxiety has been defined as relatively stable individual differences in anxiety-proneness (Spielberger, 1966, 1972).

It could be argued that in the present study, the detrimental effects of anxiety on discrimination ability were due to unmeasured state anxiety, or trait anxiety--as suggested here--or a combination of both. Since the subjects seemed relaxed and comfortable in the experimental situ-

ation, as evidenced by their laughing at particular types of messages, it seems reasonable to suggest that the subjects did not interpret the situation as personally threatening and hence, state anxiety was not a significant factor in their poor performance. That is, it would seem logical that the poor performance of anxious subjects in the present study was, in fact, attributable to trait and not state anxiety.

The present study also predicted that congruent messages would be discriminated most accurately, incongruent messages less accurately, and conflicting messages least accurately. Generally, it was found that congruent messages were, in fact, discriminated most accurately in both channels, and that incongruent and conflicting (i.e., noncongruent) messages were discriminated less accurately in both channels. However, while incongruent and conflicting messages were discriminated equally well in the vocal channel, conflicting messages were discriminated less accurately than incongruent messages in the verbal channel. It seemed that childrens' ability to discriminate incongruent and conflicting messages in the vocal channel was influenced by the humorous quality of the messages. Although conflicting messages in the vocal channel were, presumably, relatively difficult, the subjects reacted to them as if they were playing a game, laughing and joking, and apparently disregarding the information presented. The subjects did, however, react more appropriately (i.e., paid atten-

tion) to the noncongruent messages in the verbal channel, even though they were, presumably, relatively easy. Since the messages communicated in the verbal channel were apparently perceived as more credible, the subjects attended to the information presented. As a result, the more ambiguous conflicting messages were discriminated less accurately than the less ambiguous incongruent messages. It thus seems that the vocal channel is more susceptible to extraneous influences containing an affective component, such as humor, and that such influences may override the information presented. The verbal channel however, does not appear to be susceptible to such influences.

The present study also predicted that as anxiety level increased, accuracy of discrimination would decrease to a small extent for congruent messages, to a larger extent for incongruent messages, and to an even greater extent for conflicting messages. Anxiety did not affect accuracy of discrimination in the verbal channel. Performance was consistently good for congruent messages, and consistently poor for incongruent and conflicting messages, as a function of anxiety level. In the vocal channel, performance was consistently good for congruent messages, and consistently poor for incongruent messages as a function of anxiety. However, in the vocal channel, performance declined from moderate to very poor levels as anxiety increased. This latter result is consistent with anxiety theory and data in the field,

which suggest that performance will be disrupted at a high level of anxiety.

At the low level of anxiety, conflicting messages were discriminated better than incongruent messages. It is possible that at the low level of anxiety, the anxiety arousing nature of the conflicting messages (Smith, 1976), was minimized and in fact overridden by their humorous quality. At moderate and high levels of anxiety, conflicting messages were discriminated less accurately than incongruent messages. This suggests that as anxiety increased, the amusing effects of humor were reduced, allowing the role of anxiety itself to come into play.

The reduced accuracy of discrimination for conflicting messages at the high level of anxiety may also reflect Epstein's (1972) notion of "cognitive incongruity." Cognitive incongruity is based on the premise that individuals have a need to organize various inputs from their environment into a consistent, integrative, and predictive system. When hypotheses considered by the individual are either disconfirmed, or are seen as inconsistent with each other, disturbances and high levels of excitation result. In the vocal channel, very anxious subjects were unable to integrate the two opposing emotions presented by the conflicting messages. As a result, a high level of excitation was created. This enhanced excitation level, coupled with an already elevated anxiety level, resulted in the subjects' inability to inter-

grate and organize the information. As a result, accuracy of discrimination declined.

It was also suggested that competing messages from two channels tax the individual's information processing capacity and reduces discrimination ability. Overall, then, if childrens' anxiety was low, they had little difficulty discriminating conflicting messages. The humor of such messages, as well as the fun-like atmosphere of the experimental situation, tended to override the anxiety arousing nature of these messages. However, if childrens' anxiety level was high, a substantial problem occurred with their ability to discriminate such messages. This shift in performance across anxiety levels has two implications. First, for well-adjusted children, very ambiguous communications may not affect their behavior at all. Second, however, such communications can have very deleterious effects on highly anxious children. The importance of the effects of mixed messages on the behavior of very anxious children cannot be underestimated.

Let us now consider some further implications arising from the present research. These implications are discussed in two different contexts. First, they are discussed with reference to parent-child interactions; and second, they are discussed with reference to the child's academic environment.

Bateson et al.(1956) have suggested that the inability to discriminate particular types of multiple messages effectively can, in some families, produce pathological behavior in children. As well, other investigators have reported data linking conflicting multiple messages and pathology (e.g., Bugental et al., 1971; Mehrabian, 1969). For example, Bugental et al. (1971) showed that there was a greater frequency of noncongruent messages communicated in disturbed families. This finding, they suggest, provides support for the "double-bind" hypothesis. Moreover, Bugental (1974) has referred to her own unpublished data to support the notion that noncongruent messages presented in the vocal and verbal channels are more prevalent in families of disturbed children as compared to normal families. Results of the present study, showing the importance of anxiety in children's ability to discriminate multiple emotional messages, have some implications for the area of pathology and communication different from the classic notions.

While some research in the area suggests that type of message alone may produce "problem" behavior in children, (Bateson, et al.,1956) the present research suggests that subjects' ability to discriminate particular messages presented in the vocal channel (i.e., conflicting messages), declines drastically at a high level of anxiety. Thus, it may not be merely a child's failure to discriminate particular multiple messages which produces pathological behavior, but rather, a combination of an already high level of trait

anxiety augmented by the anxiety arousing nature of highly ambiguous messages which does so. That is, it is quite possible that children who exhibit some form of problem behavior as a result of mixed message communications may have been predisposed to such behavior due to their high level of trait anxiety. If problem behavior related to childrens' inability to discriminate mixed messages can, in part, be attributed to a high level of trait anxiety rather than just to poor discrimination ability, it would seem logical that if an attempt was made to reduce anxiety, problems due to the poor discrimination of multiple messages would be alleviated. Various intervention techniques related to anxiety reduction, well documented in the literature (e.g., Tobias, 1979; Phillips et al., 1972; Patterson, 1966), could be implemented to this end.

Let us now consider another implication of the present study as it applies to a child's academic environment. Although workers in the area may disagree as to the exact definition of a learning disability, many researchers in the area do agree that most children with learning disorders have some emotional disturbance (Myklebust, 1973). It is possible that such emotional problems may include an inflated trait anxiety level which could be both a component of and a contributor to their emotional disturbance. One could argue on the basis of the present study that a major factor in the etiology of learning disabilities is the in-

teraction between anxiety and particular types of multiple messages. That is, the emotional disturbance noted in children with learning disabilities may, in part, be a manifestation of a high trait anxiety combined with a high degree of cognitive incongruity produced by the communication of multiple messages. The feelings associated with cognitive incongruity, namely, confusion and disorganization, could interfere with particular learning tasks. Also, attention to and discrimination of particular messages communicated by a teacher may also be disrupted. Such an argument has merit when one considers a study by Visco (1973). He suggested that learning disabled youngsters are poorer at evaluating pitch, loudness, and rhythm, all of which occur in the vocal channel. The study thus supports the present notion that the interaction of trait anxiety and type of message, which produces poor discrimination in the vocal channel, may be a contributing factor in the etiology of learning disabilities. The argument is reinforced further, at least tangentially, by research on adolescents. Such work suggests that adolescents described as "learning disabled" are poorer at decoding multiple emotional messages than are normal adolescents (e.g., Wiig & Harris, 1974).

Students in the mainstream of the educational system may also be affected negatively by a high anxiety level. For example, it is not uncommon in this author's experience as a school psychologist to observe teachers emit mixed messages. For example, a teacher might during a reading les-

son ask a question in an overly cheerful and demanding tone, "Come on now, you know the answer!" For low anxious students, such communications may not present a problem, as anxiety has not reached a level where interference with task-relevant information (i.e., discrimination of mixed messages) may occur. However, for highly anxious students, such communications could have very deleterious effects. That is, since highly ambiguous messages communicated in the vocal channel may produce feelings of confusion and disorganization (Epstein, 1972), the very anxious child may be likely to make errors in judgement, which could lead to an improper verbal response. Such improper verbal responses could, in turn, lead to a misinterpretation of a child's behavior by the teacher. Thus, as an indirect consequence of his poor discrimination ability, the child may suffer some negative repercussions for his seemingly inappropriate behavior. Moreover, when a very anxious child is confronted with highly ambiguous (i.e., conflicting) messages, his feelings of confusion and disorganization may prevent him from responding to questions even if he knows the answer. This pattern of behavior between the teacher and the child may lead to an inappropriate feedback system. In other words, when highly ambiguous messages are communicated by the teacher, feelings of confusion and disorganization may be produced within the child. As a result, the child may be unable to respond to the teacher's question. The teacher may interpret the child's inability to respond as stubborn-

ness or insolence, and may even emit more ambiguous messages in the form of sarcasm. When the highly anxious child still fails to respond, the teacher may react negatively by sending the student to see the principal for some form of punishment. Again, it has not been an uncommon occurrence in the author's experience that teachers complain that a child is unwilling to respond to questions. Some indirect support for the notion that anxiety may be a factor in children's reluctance to respond to questions is provided by Benlifer (1977). Benlifer (1977) examined the academic and personality profiles of groups of sixth grade children classified as hand-raisers and non-hand-raisers. She found that the hand-raisers were less test anxious than non-hand-raisers. This study, taken together with the bulk of other studies investigating the effects of anxiety on task performance, suggests that anxiety not only disrupts performance, but also influences the individual's intentions and capacity to perform as well.

From the present study it is clear that a high level of trait anxiety disrupts the discrimination of multiple emotional messages. Particularly, conflicting messages communicated in the vocal channel are susceptible to the influence of anxiety. The interaction between anxiety and type of message in the vocal channel underscores the importance of including personality variables such as anxiety in further investigations of communication ability in children. The effect of anxiety on perception of emotion is especially

relevant in light of the minimal support for particular theories of abnormal behavior which are based on poor discrimination of multiple emotional messages. Moreover, the present research reflects the importance of the vocal channel in the perception of emotion.

Results of the present research suggest that further investigations involving perception of emotion may become even more meaningful when the personality characteristics of those receiving the communication are considered more extensively. As Reardon (1971) has suggested, the ability to appraise what another individual desires, feels, and may do is essential for effective interpersonal relations.

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Appendix A

WHAT I THINK AND FEEL ANXIETY QUESTIONNAIRE

What I Think and Feel

Name _____	B or G	
1. I have trouble making up my mind.	Y	N
2. I get nervous when things do not go the right way for me.	Y	N
3. Others seem to do things easier than I can.	Y	N
4. I like everyone I know.	Y	N
5. Often I have trouble getting my breath.	Y	N
6. I worry a lot of the time.	Y	N
7. I am afraid of a lot of things.	Y	N
8. I am always kind.	Y	N
9. I get mad easily.	Y	N
10. I worry about what my parents will say to me.	Y	N
11. I feel that others do not like the way I do things.	Y	N
12. I always have good manners.	Y	N
13. It is hard for me to get to sleep at night.	Y	N
14. I worry about what other people think about me.	Y	N
15. I feel alone even when there are people with me.	Y	N
16. I am always good.	Y	N
17. Often I feel sick in my stomach.	Y	N
18. My feelings get hurt easily.	Y	N
19. My hands feel sweaty.	Y	N
20. I am always nice to everyone.	Y	N
21. I am tired a lot.	Y	N
22. I worry about what is going to happen.	Y	N
23. Other children are happier than I.	Y	N
24. I tell the truth every single time.	Y	N
25. I have bad dreams.	Y	N
26. My feelings get hurt easily when I am fussed at.	Y	N
27. I feel someone will tell me I do things the wrong way.	Y	N
28. I never get angry.	Y	N
29. I wake up scared some of the time.	Y	N
30. I worry when I go to bed at night.	Y	N
31. It is hard for me to keep my mind on my schoolwork.	Y	N
32. I never say things I shouldn't.	Y	N
33. I wiggle in my seat a lot.	Y	N
34. I am nervous.	Y	N
35. A lot of people are against me.	Y	N
36. I never lie.	Y	N
37. I often worry about something bad happening to me.	Y	N

Appendix B

FINAL FIVE VERBAL EMOTIONAL STATEMENTS

ANGRY You do what I tell you right now.

SAD I will be very lonely when you go away.

HAPPY It is such a beautiful day outside.

LOVING Come here and let me give you a big hug.

NEUTRAL The car that just went by was blue.

Appendix C

RANDOMIZED ORDER OF VOCAL-VERBAL MESSAGES

Male Speakers

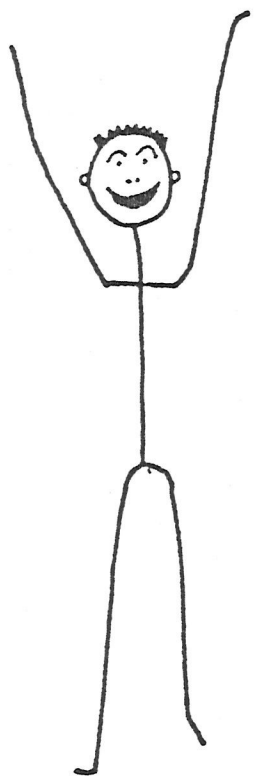
Female Speakers

A-L	N-L	N-H	A-A	N-N					
N-N	H-N	L-S	H-H	N-A	H-N	A-S	S-H	S-N	L-H
S-H	S-H	N-N	N-L	L-S	L-H	L-A	H-L	N-L	N-N
N-A	H-H	H-N	H-L	S-L	A-N	A-N	L-H	A-S	H-L
S-S	S-N	N-L	A-S	N-S	N-N	N-L	L-A	H-S	A-A
L-S	N-H	L-H	L-N	A-H	S-L	L-N	A-S	N-H	H-H
A-N	A-H	L-L	L-L	S-A	H-L	S-H	L-S	N-S	S-A
S-L	N-A	S-S	H-N	L-H	S-S	S-A	L-L	L-L	A-H
H-S	H-L	H-A	S-N	H-N	A-A	N-N	S-L	L-A	L-S
N-S	A-L	A-H	L-H	L-N	A-L	H-S	H-A	L-N	L-A
L-A	A-A	L-A	N-H	H-L	H-H	H-N	S-A	L-S	N-S
A-H	L-A	H-L	S-A	H-H	N-A	S-N	N-A	S-H	H-S
H-A	A-S	S-A	H-A	A-L	S-A	N-A	H-S	A-H	N-L
S-A	S-A	H-S	A-H	S-H	H-A	N-H	A-H	H-A	H-N
N-H	L-N	N-A	L-A	S-S	A-H	A-H	A-L	S-A	A-N
L-H	N-N	S-H	N-S	A-N	S-H	N-S	N-N	N-A	S-L
S-N	L-L	A-S	H-S	H-S	L-S	L-H	A-N	H-H	S-S
H-N	H-S	H-H	S-L	L-A	L-N	L-L	N-H	A-L	A-L
L-L	S-L	A-L	A-N	H-A	L-A	A-L	N-L	A-A	N-A
L-N	L-S	S-L	L-S	N-H	L-L	A-A	H-N	S-S	H-A
A-S	H-A	A-A	S-S	S-N	N-S	H-L	A-A	H-L	S-H
H-L	A-N	L-N	N-A	L-L	N-H	H-A	S-N	S-L	L-N
N-L	L-H	N-S	S-H	A-S	H-S	S-S	N-S	N-N	L-L
H-H	N-S	A-N	N-N	N-L	A-S	L-S	H-H	A-N	N-H
A-A	S-S	S-N	A-L	A-A	N-L	H-H	S-S	L-H	A-S
					S-N	S-L	L-N	H-N	S-N

* All messages are vocal-verbal presentations

Appendix D

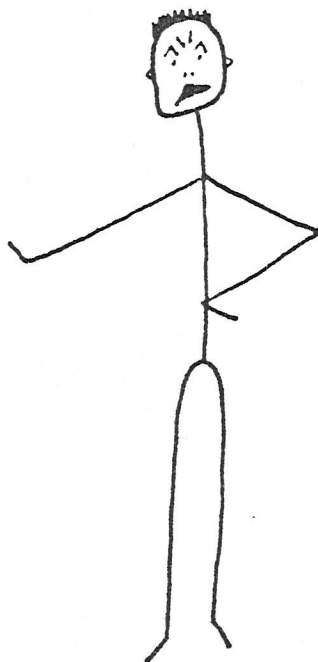
STICK FIGURE DRAWINGS - MALE



HAPPY



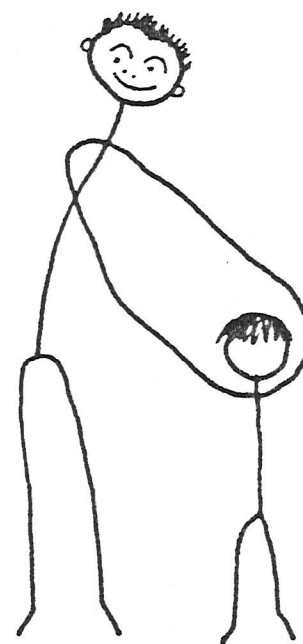
SAD



ANGRY



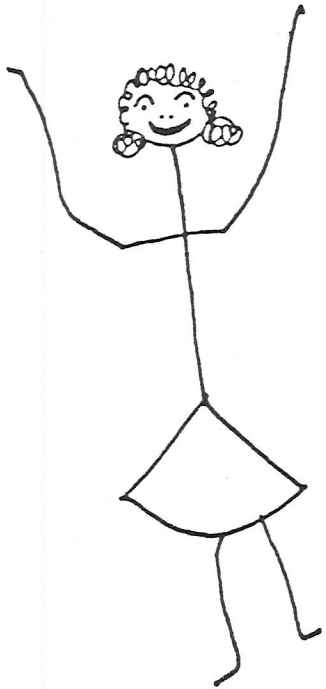
NEUTRAL



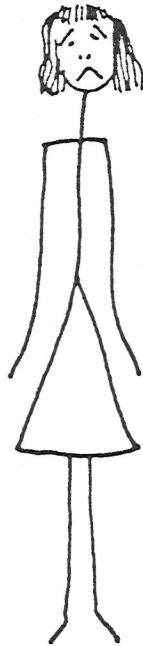
LOVING

Appendix E

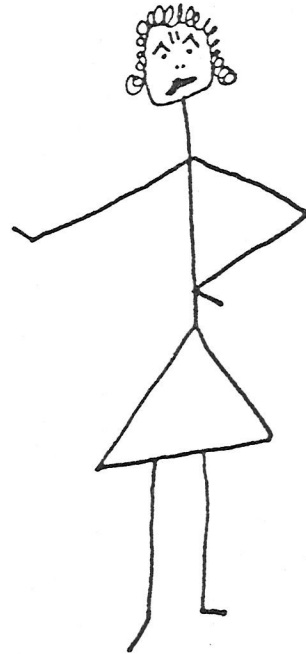
STICK FIGURE DRAWINGS - FEMALE



HAPPY



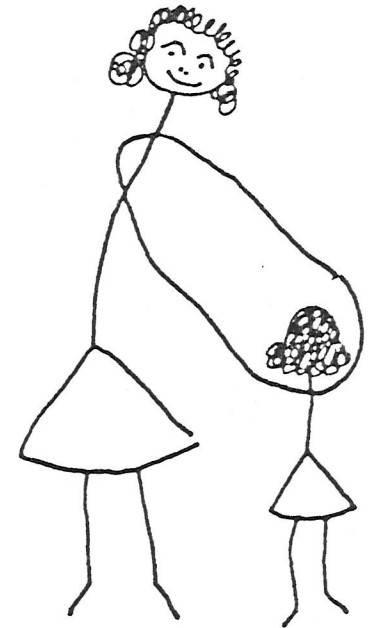
SAD



ANGRY



NEUTRAL



LOVING

Appendix F

SUMMARY OF N'S, FACTOR LEVELS, STANDARD
DEVIATIONS, AND CORRESPONDING MEANS FOR EACH
TYPE OF MESSAGE IN THE VOCAL CHANNEL

LEGEND

N = the number of subjects per cell

Sexspk = Sex of Speaker

Sexsub= Sex of Subject

Anx = Anxiety

Cong = Congruent Messages

Incong = Incongruent Messages

Conf = Conflicting Messages

Means are shown without parentheses, and standard deviations are shown in parentheses.

<u>Cell</u>	<u>N</u>	<u>Sexspk</u>	<u>Sexsub</u>	<u>Anx</u>	<u>Cong</u>	<u>Incong</u>	<u>Conf</u>
1	4	Male	Male	Low	.875 (.144)	.225 (.172)	.562 (.239)
2	23	Male	Male	Mod	.880 (.148)	.289 (.213)	.271 (.260)
3	2	Male	Male	High	.750 (.000)	.180 (.254)	.125 (.176)
4	6	Male	Female	Low	.708 (.292)	.270 (.127)	.416 (.129)
5	17	Male	Female	Mod	.926 (.117)	.217 (.162)	.132 (.179)
6	6	Male	Female	High	.833 (.129)	.195 (.155)	.041 (.102)
7	5	Female	Male	Low	.850 (.335)	.198 (.173)	.550 (.209)
8	23	Female	Male	Mod	.891 (.165)	.293 (.184)	.173 (.205)
9	1	Female	Male	High	.750 (.000)	.270 (.000)	.000 (.000)

10	4	Female	Female	Low	.812 (.125)	.337 (.225)	.437 (.125)
11	17	Female	Female	Mod	.882 (.199)	.285 (.220)	.102 (.178)
12	8	Female	Female	High	.906 (.129)	.225 (.215)	.000 (.000)

Appendix G

SUMMARY OF N'S, FACTOR LEVELS, STANDARD
DEVIATIONS, AND CORRESPONDING MEANS FOR EACH
TYPE OF MESSAGE IN THE VERBAL CHANNEL

<u>Cell</u>	<u>N</u>	<u>Sexspk</u>	<u>Sexsub</u>	<u>Anx</u>	<u>Cong</u>	<u>Incong</u>	<u>Conf</u>
1	4	Male	Male	Low	.875 (.144)	.562 (.278)	.625 (.250)
2	23	Male	Male	Mod	.880 (.148)	.563 (.252)	.358 (.397)
3	2	Male	Male	High	.750 (.000)	.720 (.254)	.625 (.176)
4	6	Male	Female	Low	.708 (.292)	.510 (.167)	.291 (.292)
5	17	Male	Female	Mod	.926 (.117)	.630 (.215)	.676 (.192)
6	6	Male	Female	High	.833 (.129)	.645 (.257)	.333 (.258)
7	5	Female	Male	Low	.850 (.335)	.720 (.238)	.500 (.395)
8	23	Female	Male	Mod	.891 (.165)	.481 (.179)	.500 (.184)
9	1	Female	Male	High	.750 (.000)	.360 (.000)	1.00 (.000)

10	4	Female	Female	Low	.812 (.125)	.562 (.247)	.437 (.375)
11	17	Female	Female	Mod	.882 (.199)	.502 (.254)	.500 (.330)
12	8	Female	Female	High	.906 (.115)	.641 (.273)	.531 (.338)