THE RELATIONSHIP BETWEEN SELECTED PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS OF SPECIFIC PERSONALITY TYPES TO SIMULATED EMOTIONAL ENCOUNTERS

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ABSTRACT

THE RELATIONSHIP BETWEEN SELECTED PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS OF SPECIFIC PERSONALITY TYPES TO SIMULATED EMOTIONAL ENCOUNTERS

By

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The purposes of this study were 1) to investigate physiological patterns of reactivity of thinkers, feelers, high empathizers, and low empathizers to a series of simulated emotions portrayed by actors on video tape, and 2) to determine levels of self-exploration among thinkers, feelers, high empathizers, and low empathizers as they recall their initial thoughts and feelings to the simulated emotions.

Current training procedures in the mental health professions have focused almost entirely on analyses of communication and covert thought processes in client-counselor interactions, but little or no attempt has been made to investigate what measurable physiological reactions occur as a trainee is exposed to basic emotions such as rejection or affection. The use of physiological

feedback may increase a person's self-awareness and enable an improvement in personal effectiveness with certain emotions. The data could also provide a greater understanding of how different personality types function in emotional situations. It is now evident that video tape procedures can be used to simulate real life emotions effectively (Kagan, 1971; Nielsen, 1962) and combined with sophisticated physiological recording devices, more effective training procedures may be developed which focus on physiological reactions as well as psychological reactions. In particular, heart rate, electrical skin conductance, and respiratory rate seem to offer promise as reliable indicators of emotional activation and deactivation.

There are two basic theories regarding physiological correlates of emotional arousal. One explanation is that a "general physiological activation" occurs in the autonomic nervous system to any and all threatening stimuli. Thus, antonomic variables such as heart rate, respiratory rate and electrical skin conductance increase in all persons as they confront threatening situations. A second explanation, called "stimulus-response specificity," maintains that physiological processes operate uniquely in the presence of threatening situations so that heart rate, respiratory rate, and skin conductance may respectively increase or decrease

depending on the nature of the stimuli, individual personality factors, and coping styles.

Findings by Lacey (1963) lend support to the "stimulus-response specificity" view, in that an inverse relationship between heart rate and electrical skin conductance has been observed among subjects as they were confronted with a series of simulated emotions portrayed by actors. Also, a new methodology for the study of physiological reactivity has provided some support for this view (Archer et al., 1971).

However, evidence is lacking on how known personality groups react to emotional situations. This study tests the "stimulus-response specificity" view and tests hypotheses related to physiological differences between known personality groups when they are exposed to a series of simulated emotions.

Forty subjects from undergraduate psychology and education courses at Michigan State University were divided into four groups of "thinkers," "feelers," "low empathizers," and "high empathizers" on the Myers-Briggs Type Indicator and the Affective Sensitivity Scale using the grand median of each test. All subjects were exposed to the same treatment which consisted of viewing eight video taped scenes of two planned emotions: seduction-affection and rejection-anger. These emotions were portrayed by

an actor and an actress and varied in emotional intensity. Each scene was preceded by a rest period and an alert period so that there were a total of eight rest periods, eight orientation periods, and eight stimulus vignettes. Heart rate, electrical skin conductance, and respiratory rate were recorded during all rest, orientation, and vignette conditions. After viewing these scenes, the physiological equipment was disconnected. The scenes were immediately shown to each subject again, and he was instructed to talk about his reactions to each scene. His statements were rated on a scale of Self-Exploration.

Several fixed effects repeated measures analyses of variance were used to test eight of the eleven hypotheses. Each of the eight hypotheses was tested for rest, orientation, and vignette across all eight trials. A correlation analysis was used to test the remaining hypotheses. The hypotheses are listed below:

H_1 Feelers will have a lower $\overline{HR}$ than thinkers across treatments.

H_2 High empathizers will have a lower $\overline{HR}$ than low empathizers across treatments.

H_3 There will be no correlation between levels of self-exploration ratings and $\overline{HR}$.

H_4 Feelers will have a higher $\overline{ESC}$ than thinkers across treatments.

H_5 High empathizers will have a higher $\overline{ESC}$ than low empathizers across all treatments.

H_6 There will be no correlation between levels of self-exploration ratings and $\overline{ESC}$.

H_7 There will be no significant difference between feelers and thinkers on $\overline{f}$ across treatments.

H_8 There will be no significant difference between high empathizers and low empathizers on f across treatments.

H_9 There will be no correlation between levels of self-exploration ratings and f.

H_{10} During the replay, self-exploration ratings will be greater for feelers than for thinkers across vignettes.

H_{11} During the replay, self-exploration ratings will be greater for high empathizers than for low empathizers across vignettes.

With the exception of hypotheses seven, eight, and ten, none of the hypotheses were supported at alpha = .05. However, all alpha levels were reported. Hypotheses seven and eight stated in null form were not rejected at alpha = .05. The result of hypothesis nine indicated that feelers were rated significantly higher on a measure of Self-Exploration for all scenes than thinkers. The correlational analysis between levels of self-exploration and average heart rate, average electrical skin conductance, and respiratory rate revealed no correlation significantly different from zero.

Slope estimates and rank order estimates of the groups for each physiological variable were presented, but must be regarded as tentative because of the nonsignificant results. The slope estimates seemed to indicate that F's were more like LE's

on $\overline{HR}$, while T's were more like HE's on $\overline{HR}$. F's, LE's, and HE's had similar slopes on $\overline{ESC}$. All groups showed little difference from one another on f. F's had larger slopes than T's, LE's, and HE's on $\overline{ESC}$.

On rank order estimates, derived from averages for each group for each physiological variable during the vignette condition only, LE's had the highest $\overline{HR}$'s and f's; while HE's had the lowest $\overline{HR}$'s and f's. On $\overline{ESC}$, HE's had the highest $\overline{ESC}$; LE's had the lowest $\overline{ESC}$.

Conclusions

The results of this study do not provide conclusive evidence for the "stimulus-response specificity" theory. The only significant result occurred on the Self-Exploration Scale.

Feelers are more clearly open to exploring their reactions toward the vignettes than thinkers as evidenced in their significantly higher ratings on Self-Exploration. Research by Carkhuff (1969) has shown that the apparent small difference (F's 2.8, T's 2.2) is large enough to be a real difference.

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CHAPTER I

STATEMENT OF PROBLEM

Problem

This study will analyze selected physiological and psychological reactions to simulated emotional encounters of specific personality types. The physiological measures are heart rate, electrical skin conductance, and respiratory rate. The psychological factor is self-exploration and the emotional encounters are filmed vignettes of actors talking as if to the viewer.

Need

Three principal areas of mental health constitute a need for this study: 1) selection and training procedures for mental health workers, 2) methods of accelerating client growth in counseling and psychotherapy, and 3) expanding the theoretical understanding of physiological activation patterns among individuals.

With the advent of both video tape procedures and new physiological recording techniques, the possibility exists of using

physiological monitoring in selection procedures and recordings and feedback in training programs for mental health workers. Video tape procedures by themselves have a potent visual dimension that can accelerate the acquisition of interpersonal communication skills necessary in establishing and maintaining helping relationships (Berger, 1971). One outgrowth of video tape procedures for use in counselor training programs is the recent development of affect simulation films (Kagan, 1971) in which actors portray basic emotions. If, in addition to the use of video simulation techniques, physiological indices such as heart rate, electrical skin conductance, and respiratory rate can be recorded and played back to trainees, even more effective results may be obtained in these training programs because one might suppose, the trainee could be made even more aware of his reactions to others and be better able to modify and improve his reactions. It might also be possible to select more desirable counselor types using these combined procedures. The analysis of prospective counselor trainees might provide additional information on which types can profit most from training procedures.

In the second area, physiological feedback along with video feedback based on simulated emotions might be useful in improving the diagnosis and in accelerating treatment. Studying known groups

such as alcoholics and nonalcoholics or schizophrenics and nonschizophrenics may clarify the nature of "healthy" and "unhealthy" physiological response patterns. Also useful might be the study of normal personality types such as thinkers and feelers or high empathizers and low empathizers, the groups selected for this study. By recording the physiological activity of prospective clients to simulated emotions during the initial interview, it is possible that a more comprehensive history of the client's emotional problems can be obtained, and in a short period of time. In treatment, specific emotional simulations could be planned to accelerate client awareness of reactions to such basic emotions as anger, rejection, seduction, and affection. The counselor could use the client's physiological reactions to these emotions as cues for detailed investigation of interpersonal coping strategies, defense mechanisms and levels of involvement with others; the working through process could be accelerated. Being confronted by one's own physiological pattern of activity even without counselor intervention might also provide valuable self insight and behavior change.

The third area of need is for gaining a better theoretical understanding of activation patterns in individuals. The research literature contains very little information about the momentary

physiological changes that accompany psychological reactions to threatening stimuli.

Such information could contribute more definitive answers about relationships between certain personality types, about levels of awareness and about control of physiological processes during exposure to interpersonal emotions. The basic questions that are considered are: 1) do personality types react differently to simulated emotions?, 2) how "deeply" do each of these personality types explore their reactions to specific emotions?, and 3) do persons who are rated as deeper at exploring their own reactions to emotional experiences differ from other persons on physiological measures?

Hypotheses

The general aim of this study is to determine if certain personalities react differently when confronted with simulated interpersonal emotions. Specifically this research is designed to investigate what relationships exist between two personality types and physiological and psychological responses to viewing simulated emotions. Physiological responses of heart rate (HR), electrical skin conductance (ESC), and respiratory rate (f) will be recorded and a measure of Self-Exploration will be used to determine

self-awareness upon reviewing certain emotional scenes. The personality types are defined as thinkers and feelers and identified by the Myers-Briggs Type Indicator. A secondary purpose of this study is to analyze what relationships exist between high empathizers and low empathizers and physiological and psychological responses to viewing simulated emotions.

The major hypotheses to be tested are:

1) Thinkers will be less reactive physiologically when confronted with simulated emotions of affection-seduction and rejection-anger than feelers.

2) High empathizers will be more reactive physiologically when confronted with simulated emotions of affection-seduction and rejection-anger than low empathizers.

3) Subjects who are both feelers and high empathizers will reveal a higher degree of self-exploration as they recall and summarize their initial confrontation with the simulated emotions of affection-seduction and rejection-anger than subjects who are both thinkers and low empathizers.

These hypotheses are presented in testable form in Chapter III.

Theoretical Perspective

This study can be conceived of as a test of the theory of stimulus-response specificity, which states that for a given set of physiological functions, individuals tend to respond with a pattern of autonomic activation in which maximal activation occurs in the same physiological function, whatever the stress (Lacey, Bateman,

and Van Lehn, 1953). The particular studies providing experimental verification for this theory and for the opposing theory are reviewed in Chapter III.

The major assumptions for this study are derived from studies relating to physiological responsivity to emotional stress, to video tape simulations of emotion and to personality types. These assumptions are stated below and will be reviewed in detail in Chapter II.

Assumptions

Physiological

1. It is assumed that little, if any, deliberate conscious control of autonomic physiological responses will occur in this experiment.
2. Valid correlates for measuring autonomic physiological reactivity are heart rate, eccrine sweat activity with respiratory rate representing some degree of somatic neural control.

Video Tape Simulations

1. Evidence indicates that emotions portrayed by actors can and do involve viewers in a realistic manner (Kagan et al.,

1967, Grossman, 1971); none the less, it must be assumed that simulated emotions of affection and rejection used in this study are sufficiently common in content to stimulate emotional arousal in the subjects.

Personality Types

1. For the purpose of this study, it is assumed that the population is made up of thinkers and feelers. In the history of psychology and philosophy man has characteristically been categorized into a reasoning component and an emotional component. A logical outcome of this schema has been to categorize behavior into two types which are composed predominantly of a thinking life style or a feeling life style. While no one person behaves solely as a thinker or as a feeler, it is assumed that persons are predisposed to react in one mode or the other in interpersonal situations.

Operational Definitions

1. Physiological Reactivity or Responsivity refers to autonomic functions which are largely involuntary.
2. Eccrine Sweat Activity is a particular form of sweat response that originates in the eccrine sweat glands.

3. Electrical Skin Conductance (ESC) is a measure of an electrical property of the skin related to eccrine sweat gland activity.
4. Heart Rate (HR) refers to the number of myocardial cycles per minute.
5. Respiratory Rate (f) is the number of breaths per minute.
6. Apnea is a short term cessation of respiratory movement.

Overview

A review and discussion of pertinent research is presented in Chapter II. Emphasis is given to recent advances in psychophysiological research and video simulation techniques in human interaction. The experimental design is formulated in Chapter III, along with a description of the sample, research hypotheses, and method of analysis. Also included in Chapter III is a description of the selection procedures, post testing, the preparation and treatment of subjects, a description of the physiological apparatus, and the content areas of the stimulus material. Chapter IV includes the analysis and results of the research hypotheses using analysis of variance and correlational procedures.

CHAPTER II

SURVEY OF PERTINENT LITERATURE

Introduction

In this chapter, physiological and psychological factors will be reviewed as they pertain to interpersonal threat and emotional stress. Particular emphasis will be given to research supporting the theory and assumptions mentioned in Chapter I, to research evaluating the effectiveness of affect simulation, and to studies dealing with specific personality types and physiological reactivity. The Affective Sensitivity Scale, the Myers Briggs Type Indicator, and the Self-Exploration Scale will be discussed also.

General Physiological Activation in the Autonomic Nervous System

In psychophysiological stress research, two major categories of physiological responses have been investigated. One consists of autonomic nervous system reactions and the other involves secretions of the adrenal glands (Lazarus, 1966). The

dependent variables for the present research program deal only with the autonomic nervous system and literature related to adrenal gland function will not be reviewed. The ease of measurement and the reliability of physiological measures is the major justification for restricting the dependent variables to the ANS.

The autonomic nervous system (ANS) has been discussed in a psychophysiological context by several writers (Woodworth and Schlosberg, 1954; Lazarus, 1966; and Sternbach, 1966) who cite Cannon's classic work (1928) on the theory of emotional arousal and its relationship to the brain and hypothalamus. His theory of emotion states that strong emotions prepare the organism for vigorous activity during fear and rage. The importance of the ANS is that it functions primarily to regulate the internal milieu of the body. The ANS is divided into a sympathetic nervous system (SNS) and a parasympathetic nervous system (PNS) which invoke dissimilar functions. For example, the SNS fibers are cardiac accelerators; PNS fibers are cardiac decelerators. Strong SNS activity has been called "flight or fight" reaction with noticeable increases in heart rate, breathing, sweating, blood pressure, and pupil dilation and changes in other physiological responses.

Theoretical Explanations for Emotional Arousal

Several major theories have been proposed to explain physiological activation to threatening stimuli (Cannon, 1928; Arnold, 1960; Lazarus, 1966; Lacey, 1959; Ax, 1953).

General Activation

Cannon (1936) has shown that the same massive SNS activity occurred in three states: fear, anger, and pain responses. In his writings, he emphasized that only the SNS responded to noxious stimuli and that all SNS effectors showed equal maximum activity to meet emergency situations. Selye (1950) has supported Cannon's theory of generalized response to threat by biochemical analysis. Selye (1950) employed a variety of "stressors" (such as emotional upsets, exposure to extremes in temperature, and anoxia) which set into motion defense reactions mediated through the nervous and hormonal systems.

Stimulus Response Specificity

Ax (1953), in a study of the physiological differentiation between fear and anger, contributed evidence that disputed Cannon's conclusions about massive SNS reactions. Anger was induced by having an "incompetent" polygraph operator handle the subjects

roughly and criticize and insult them. In the fear condition, subjects received mild shocks about which the experimenter expressed surprise and then exclaimed with alarm that there was a dangerous high-voltage short circuit. Each of the 43 subjects received both treatments, which were alternated in order among them. Seven of the physiological variables showed significant differences between the two conditions. "Diastolic blood pressure rises, muscle tension increases, heart rate falls and the numbers of rises in GSR were greater for anger than for fear." By contrast, Ax noted, "electrical skin conductance increases, respiratory rate increases and the number of muscle tension peaks were greater for fear than for anger." In order to justify the use of two aspects of one variable (e.g., number of GSR's vs. skin conductance increases and muscle tension increases vs. number of muscle tension peaks), Ax computed product moment correlations which demonstrated almost a complete lack of correspondence between them. Low intercorrelations among the physiological variables and significantly greater between subject variance supports the hypothesis that there is considerable specificity in physiological response patterns (Malmo and Shagass, 1949; Lacey, 1950). That is, the entire SNS does not automatically respond to all stress situations with general activation. One criticism of the design of this study is that the intensity of the

two conditions could be confounded. While this evidence did not wholly refute Cannon's theory of massive SNS activity to fear, anger, and pain, it revealed a further differentiation in the physiological reaction pattern. Ax's findings were later supported by Schachter (1957) in a related study of pain, fear, and anger with hypotensives and normals. Other researchers have added evidence to Ax's findings (Davis et al., 1955; Engel, 1958; Sternbach, 1960; Wenger and Cullen, 1958).

One of the major problems associated with stress measurement is the low correlation obtained between measures such as heart rate and electrical skin conductance. Lazarus (1966) criticized the statistical procedures used by many researchers which resulted in correlations across individuals. He suggested the alternative approach of measuring intra-individual correlations to determine the degree to which heart rate and skin conductance rise and fall together in a single physiological system. His studies have found increased but low correlation between heart rate and electrical skin conductance.

In view of the problem of low correlations between heart rate and electrical skin conductance measures, concepts of stimulus-response specificity have been proposed (Lacey, Bateman, and Van Lehn, 1953; Lacey and Lacey, 1958; Engel and Bickford, 1961).

These concepts imply that different autonomic reaction patterns are associated with the specific threat or noxious stimuli (stimulus specificity) and further that different autonomic reaction patterns are consistently found in different individuals across different kinds of threat (individual-response specificity).

Lacey noticed in some studies (1959) examples of what he called "directional fractionation of response." "These are instances in which the direction of change in one physiological variable is contrary to what might be expected from the still persistent Cannon like view of overall-sympathetic activation by stress." The directional fractionation consisted of instances in which the heart rate decelerated, but skin electrical conductance increased. The heart rate decelerations occurred when subjects were required to attend to visual and auditory stimuli such as patterns of lights and dramatic situations on tapes. Heart rate accelerated under conditions requiring "mental concentration" such as solving mental arithmetic problems. Lacey concluded that cardiac deceleration accompanied or facilitated "environment intake"; whereas cardiac acceleration accompanied or facilitated "rejection of the environment." In all cases electrical skin conductance increased. Further studies by Lacey (1963) have extended and verified his earlier findings. These studies have demonstrated clearly that stimulus-

response specificity exists. One implication is that tasks emphasizing cognitive functioning are accompanied by heart rate increases, while those emphasizing perceptual functioning are accompanied by heart rate decreases.

Several important implications from these findings have been discussed by Sternbach (1966). He maintained that it was possible to classify the responses to stimuli in terms of their functional significance, and to detect regularities of autonomic patterning according to such functional groupings. That is, instead of trying to define emotions physiologically as a means of clarifying autonomic patterning, he argued that there was a need to enhance stimulus input or a need to decrease perceived stimulus intensity to clarify autonomic patterning. The criticism against low inter-variable relationships levied by Lazarus (1966) could now be explained away by Lacey's findings. That is, low inter-variable relationships signify important differences in the subject's interpretation of the situation and are to be expected. However, Lazarus (1966) has pointed out that Lacey's findings suggest that the pattern of autonomic reactivity is at least in part determined by the type of process engaged in by the subject for coping with threat. Both Arnold (1960) and Lazarus (1966) have argued that cognitive appraisal might be an important part of the specificity

theory. That is, one might react differently if one has one cognitive "set," while another has a different cognitive "set."

Eccrine Sweat Glands

It is generally accepted that the eccrine sweat gland activity is responsible for skin resistance level (SRL) and skin resistance responses (SRR). These two measures are actually reciprocals of skin conductance level (SCL) and skin conductance response (SCR) respectively, and relate to the same phenomena, namely, electrical skin conductance associated with skin hydration. There are two areas of the body surface which contain the densest concentration of "emotional sweating areas," the palmar surface of the hands and the soles of the feet (Kuno, 1934), and these areas also provide the lowest resistance and most readily elicited SRR (Venables and Martin, 1967).

Recording Methodologies

Two indirect methods for recording sweat gland activity have been used (Venables and Martin, 1967). The first approach, called skin resistance recording, introduces an external current and uses either a constant current system or a constant voltage system. A Wheatstone bridge circuit is the typical measurement

device used with a constant current system. Another measurement circuit has been designed by Hagfors (1964) and operates on a constant voltage system. Hagfors has argued that his bridge "probably gives a more truthful measure of the original physiological changes in GSR than a resistance calibrated apparatus (Wheatstone bridge) and saves one from tedious mathematical transformations from resistance to conductance values" (Hagfors, p. 1.). Brown (1967) has contended that if constant voltage is applied to the skin, each element will draw an amount of current in proportion to its conductivity. If the sweat glands open or close, current does not change. However, in a constant current system, the available current will partition itself among the various skin elements in accordance with their relative conductivity. The major advantages of a constant voltage system are:

1) The development of high voltages and an accompanying injury effect at high subject resistance is avoided.

2) The system is self-correcting for peripheral effect of base level on response amplitude.

3) The source impedance seen by the amplifier is low and constant, contrary to the case with constant current.

4) Deflections are in terms of conductance units. This eliminates one step in ultimate data reduction. . .

5) The current flowing through one element of the electrode is independent of what is flowing through the others.

6) Under certain conditions the constant voltage system may be used for sites of different size without current adjustment. This is not true of constant current circuits. (Brown, 1967).

Several problem areas in using the voltage system deserve mention. With a dry stratum corneum an unduly low indication of the magnitude of the membrane change may occur (Brown, 1967). Thus, a well hydrated skin zone is essential in the constant voltage system.

Another problem associated with the constant voltage system is that of uncontrolled current through the subject. The bridge developed by Hagfors reduces this problem considerably provided the system is in balance. While this circuit does not stimulate the sweat glands directly, it provides a stable direct relationship between SC and sweat gland activity.

The second technique for indicating sweat gland activity is by means of skin potential. An electrolyte plays a major role in the determination of skin potential level (SPL) and skin potential response. According to Venables and Martin (1967), "A basal standing level of potential differences is found to exist between electrodes placed on palmar and indifferent forearm sites." Skin potential changes occur which are usually biphasic as contrasted with skin conductance changes which are monophasic.

The method of recording sweat gland activity for this study was the skin conductance method. It was selected for the reasons reviewed by Brown (1967).

Status as an Emotional Indicator

As early as 1888 evidence existed that rapid fluctuations of skin resistance could occur in response to emotional stimulation (Brown, 1967; Venables and Martin, 1967). Brown (1967) has noted that this measure took on added significance when Richter, in 1929, provided conclusive evidence that intact sympathetic innervation was necessary to elicit the reflex in humans. With the advent of sophisticated measuring equipment and a growing interest in the physiological aspects of psychological behavior, the electrodermal responses gained fame as a reliable emotional indicator. Although it is probably the most widely used and sensitive index of level of activation (Lader, 1967; Lacey, 1959; McCurdy, 1950), considerable debate exists whether or not it measures "emotion" (Woodworth and Schlosberg, 1954). Woodworth and Schlosberg (1954) have preferred the term activation to emotion, while Lazarus (1966) has used arousal and activation interchangeably.

Confusion also exists regarding proper terminology for this measure. Galvanic skin response is most widely used

currently, but according to Woodworth and Schlosberg (1954), a more accurate term is the electrodermal response (EDR).

A large number of studies have correlated the GSR with low fidelity emotional experiences such as word intensity ratings (Wechsler, 1925; Syz, 1926), conditioning experiments (Kamiya et al., 1971; Wolpe, 1958), reactions to physical or subjective pain (Lazarus, 1966; Thayer, 1967; Pearson and Thackray, 1970). Relatively few studies have been reported on relationships between the GSR and interpersonal situations (Costell and Leiderman, 1968; Hill, 1967; Wilson, 1968; Bixtenstine, 1955; Baker and Schaie, 1969).

Costell and Leiderman (1968) used an experimental situation based upon a contrived manipulation of group opinions. They found that individuals who are independent and manage to fend off the majority opinion of four other people in a group exhibit higher arousal levels as measured by skin potential level. Nonindependent subjects show a reduction in skin potential level. The authors suggest that reduction in skin potential level may reinforce conformity.

In a study on social motives, Hill (1967) investigated the effects of facilitating or inhibiting instructions on the conditioning of the GSR in relation to the need for approval. High need for approval subjects consistently responded with higher GSR's than low need for approval subjects.

Wilson (1967) found that galvanic skin response increased as subjects responded to fear-related stimuli consisting of spider pictures. It may be questioned, however, what relationship exists between fear of spiders and interpersonal threat.

Bixenstine (1955) compared the daily palmar sweating patterns of a doctoral student about to take qualifying examinations and subsequently to begin psychotherapy with the palmar sweating of his wife. General decreases in palmar sweating were found after therapy sessions. Similarities in sweat patterns were noticed between the husband and wife, although her pattern was lower. Although an N of 1, the study is notable because it provided an objective and consistent means of studying stress over time and under both therapeutic and real life conditions.

Baker and Schaie (1969) studied effects of aggressive and counteraggressive behavior on physiological and psychological arousal. Subjects were assigned to two treatment conditions: one in which they counteraggressed alone; the second where they expressed aggression with another person. Results were not significant.

Heart Rate Activity

Status as an Emotional Indicator

The heart rate measure has been used extensively in psychophysiological experiments as an index of emotional arousal

(Anderson, 1956; Buckhout, 1966; Gottlieb, Glaser, and Gottschalk, 1967; Lacey et al., 1953; Lazarus et al., 1963; Sternbach, 1966; Venables and Martin, 1967). The major advantage associated with the use of heart rate in research is the comparative ease of obtaining records. In addition, the discrete nature of the heart beat makes it relatively easy to quantify precisely.

Measurement Methodologies

In general heart rate recording instruments require a uniform square wave input pulse on each heart beat (Venables and Martin, 1967). This pulse provides the input for the recording equipment. The entire process of converting the EKG waveform to a suitable square wave pulse has been reviewed in detail by Venables and Martin (1967) and will not be discussed in this section.

Respiratory Rate

Status as an Emotional Indicator

Respiratory rate has been described as a reliable indicator of emotional arousal by several researchers (Brown, 1967; Venables and Martin, 1967; Woodworth and Schlosberg, 1954). It has also been used as an index of personality types, in conditioning experiments and with psychosomatic disorders (Brown, 1967).

Conditioning experiments (Venables and Martin, 1967) have demonstrated positive correlations between respiratory rate and emotional arousal in that during excited states, breathing tends to be fast and deep. However, as Woodworth and Schlosberg (1954) have pointed out, there is a question whether respiratory movements increase involuntarily during activation states. Sudden stimuli will also cause subjects' breathing to be shallow and quickened.

Shaggs, as cited by Woodworth and Schlosberg (1954), has described the following breathing activities in response to specific stimuli.

1) In mental multiplication, compared with the resting condition, breathing was usually quick and shallow.

2) In anxious expectancy, the rate tended to increase and the depth to remain normal.

3) After a shock or a surprise, too, the rate was high and the depth about normal, and the breathing was irregular.

Few psychophysiological experiments have used respiratory rate as the major variable of interest. Stein and Luparello in Brown (1967), have reviewed the major studies under the headings of emotion and respiration, personality types and respiration, conditioning techniques and respiration, and respiratory physiological disorders. Only the first two headings are relevant to this study.

Several studies are described which report respiratory changes to pleasant or unpleasant ideas or emotions, the relationship of psychodynamic patterns and respiration, and the effects of hypnotic suggestion upon ventilation and oxygen consumption.

Another study reviewed by Stein and Luparello (1967) found that the discussion of pleasant life situations caused an increase of diaphragmatic movement while unpleasant situations restricted it. Contradictory findings are reported in another study by Wolf, who found that discussion of conflicts caused an increase in respiratory rate. Another study by Lovett-Doust and Schneider, as reviewed by Stein and Luparello (1967), found that stressful stimuli with specific emotional meaning to a subject produced significant anoxemia or carbon monoxide accumulation.

Under the heading of personality types and respiration several studies are reported which have significance to the present study. Romer's study as reviewed by Stein and Luparello proposed that different personality types could be identified by their respiratory patterns. Nielson and Roth (1929) found that it was possible to classify individuals on the basis of their respiratory patterns into nine basic types. They are: Type A--normal; type B--hypotensive and neurotic and psychotic states; type C--almost exclusively women; type D--masculine; type E--colitis and neurotic states;

type F--obesity present but rare; type O--almost exclusively female; type H--childhood; type I--high uric acid content.

These authors concluded that "the respiratory types were hereditary and that the occurrence of a specific type of breathing presages certain predispositions in the individual." For example, a certain type of spirogram occurred more often with neurotic and psychotic states than with normals. Edelberg (1967) has questioned the validity of this evidence. According to Edelberg (1967), Solla and Antonovitch found evidence of two types of habitual respiration among their subjects. The regular pattern of respiration occurred in subjects who utilized predominantly visual imagery, while the irregular type of breathing was found in subjects with predominantly auditory imagery. Wittkower (1935) has reported, however, that the two types of breathing are evenly distributed among a normal population.

A final piece of evidence for the importance of respiration as a psychophysiological measure is its use in the interpretation and analysis of heart rate data. This evidence has been reviewed under the section titled Heart Rate Activity.

Recording Methodologies

According to Brener (1967), "The respiratory cycle consists of an active inspiratory phase and a passive expiratory phase.

During inspiration the diaphragm descends and the chest wall is pulled outwards by contractions of the external intercostal muscles. At the end of inspiration, the external intercostal muscles and the diaphragm relax allowing the chest wall to recoil. These naturally occurring changes in the size of the chest wall provide a readily measurable response."

Three types of methods have been reported for recording respiration:

> Those which depend on the volume of air inspired or expired by the subject, those which depend on changes in the size of the chest wall during respiration, and those which depend on temperature changes (usually in the mouth or nose during respiration). (Brener, 1967)

The first method uses expensive and specialized equipment and according to Woodworth and Schlosberg (1954) it is "cumbersome. . . . and does not reflect rapid changes." The other two methods are simple and economical devices. According to Brener (1967), the second technique has been more frequently used in psychophysiological investigations. Strain gauges which convert changes of tension into changes in electrical resistance have been commonly used along with plethysmographic equipment. Resistance strain gauges are made by filling a small bore rubber tube with a fluid substance which has an easily measurable electrical resistance such as mercury or zinc sulphate. The tube is then sealed at both

ends with metal terminals and attached to an elastic band which is tied around the subject' s chest. During inspiration, the tube will stretch and the electrical resistance between its two terminals will increase. During expiration, the tube will recoil and the electrical resistance between the terminals will decrease. By connecting the strain gauge to a Wheatstone bridge which is then connected to a polygraph recorder, respiratory rate, amplitude, and percentage inhalation time can be recorded (Venables and Martin, 1967). The most favored measure is rate because amplitude measures are less reliable intra-subject data (Stein and Luparello, 1967) and because most studies have used rate as the principal measurement. Researchers have criticized the strain gauge technique for several reasons. Stein and Luparello (1967) have contended that "respiratory frequency is not an entirely valid measure of ventilation since either fast or slow rates may be associated with hypo- or hyperventilation." Brener (1967) has criticized the strain gauge approach on the grounds that it responds to all chest movements. He suggested the use of a thermistor which records changes in temperature in the nose or mouth and is thus a more accurate recording of respiratory activity. However, the thermistor can be uncomfortable for subjects because it is necessary to insert it in the nose or mouth.

Using Heart Rate, Electrical Skin Conductance, and Respiratory Rate Simultaneously in Psychophysiological Research

The use of ESC, HR, and f as single measures of emotional arousals has been reviewed in the previous sections. A growing body of evidence has demonstrated the utility of combining ESC and HR measures so that more accurate assessments can be made of inter- and intra-subject physiological changes to emotional stimuli (Lacey and Lacey, 1958; Lazarus et al., 1963; Roessler and Collins, 1970; Sternbach, 1966; Thayer, 1967).

Few experiments have used respiratory rate in combination with ESC and HR measures (Sternbach, 1966). Its use as a possible mediator for HR may provide useful information about the relationship between the other two measures and may have discriminating value for the two personality types and the levels of empathy used in the present study.

An interesting relationship exists between heart rate and respiration rate. According to Venables and Martin (1967), "heart rate changes are known to bear a systematic relationship to changes in respiration behavior and it is therefore possible that observed changes in heart rate may have been mediated by induced changes in respiration." It is known that during the inspiration phase of

breathing heart rate increases and during the expiration phase of breathing it decreases. (See Figure 2.1.)

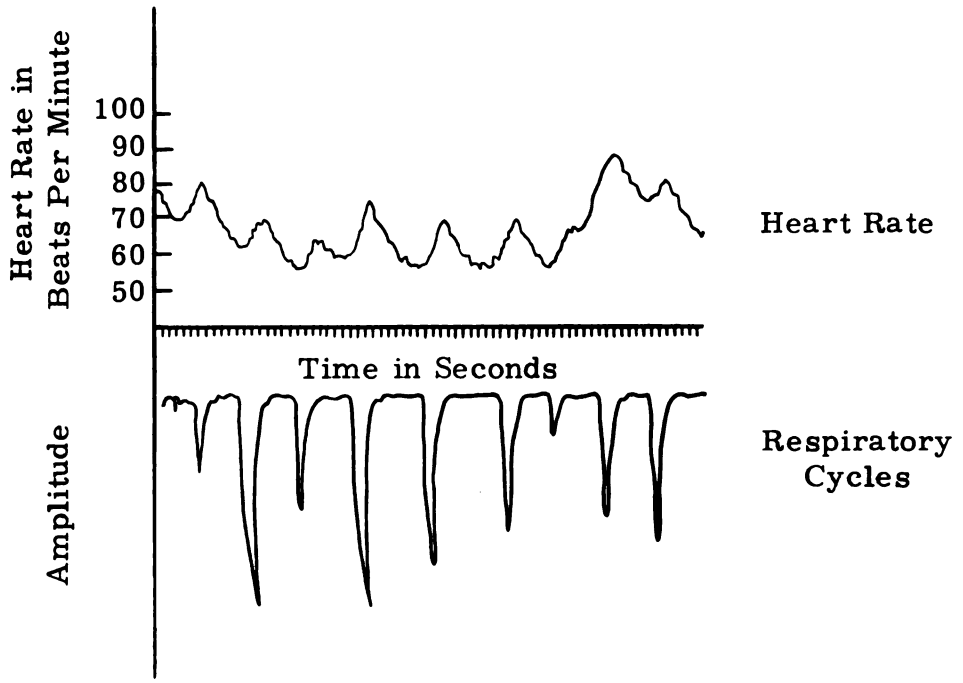

Figure 2.1. -- The phenomenon of sinus arrhythmia.

The phenomenon is called sinus arrhythmia and is commonly found in young children and young adults. Venables and Martin (1967) have pointed out that it tends to disappear as the subject passes from a relaxed state to one of high arousal.

Personality Types and Physiological Responsivity

Closely Related Studies

No evidence has been accumulated on physiological characteristics of thinkers, feelers, high or low empathizers. A

related series of investigations dealing with the relationship between personality types, defined as high or low ego strength and physiological responsivity, has been conducted by Roessler and his associates (Roessler, Alexander, and Greenfield, 1963; Roessler, Burch, and Wilders, 1966; Phaehler and Roessler, 1965). The measure of ego strength used was the Barron Scale (Es) from the Minnesota Multiphasic Personality Inventory. Physiological measures included skin resistance, finger blood volume, muscle potential, blood glucose, and respiration. In all their experiments an inverse relationship was found between anxiety and level of ego strength. Moreover, high ego strength subjects were physiologically more responsive to qualified simple stimuli than were low ego strength subjects.

The most recent experiment of Roessler and Collins (1970) is typical of the basic approach used in his previous studies cited above. A stressor film was used as the treatment to test the major hypothesis that the high ego strength (HE) group would be more responsive than a low ego strength (LE) group to viewing traumatic events. A second hypothesis predicted a greater range of activation in HR and SC for the HE group. A third hypothesis was that SC and HR values would be lower while viewing a bland film than during a resting condition. The data were also examined

to determine whether Lazarus' (1967) results were replicated. Results were consistent with the previous studies directed by Roessler. Roessler summarized these findings by stating that "HE's appear to be persons who are pervasively more responsive to their environment and to change in it." LE's may be employing "perceptual defense" more pervasively and indiscriminately. Differences were significant on the skin conductance measure only. With respect to the second hypothesis tested, Roessler and Collins (1970) found evidence of a greater range of HR and SC in the HE group than in the LE group. This result lends support to the stimulus-response specificity theory reviewed previously. The findings were also contrary to the conclusion reached by Opton and Lazarus (1967) that efforts to relate personality and physiological variables "have yielded disappointingly slight and ephemeral relationships. . . ."

Less Related Studies

Becker (1960) examined Eysenck's hypothesis that cortical inhibition is related to individual differences in extraversion-introversion. His results indicated that basal cortical inhibition was not related to extraversion-introversion. The belief that the extravert generates more cortical inhibition faster and dissipates

it more slowly than the introvert was not substantiated. Eysenck (1953) has argued that extraversion and introversion are related to the direction of the deviation from autonomic balance. He mentioned that those with apparent SNS dominance are more extraverted, while those with apparent PSN dominance are more introverted.

Wenger (1947) found that children with strong apparent PSN dominance showed more emotional inhibition, less emotional excitability, a lower frequency of activity with less fatigue, and more patience and neatness than those with marked apparent SNS dominance.

In a study of psychiatric patients, Malmo and Shagass (1949) gave the subjects a stress test consisting of pain induced by radiant heat on the forehead. Records were made of heart, respiratory rate, and neck muscle potential. The head complaint group developed significantly greater potentials in the neck than did the others, while the heart complaint group showed greater changes in heart and respiratory functions during the treatment. The results suggested that some subjects respond to stress by increased activation of the neck muscles while other subjects respond by visceral changes.

Two studies done by Mundy-Castle (1955, 1958) have revealed a relationship between intelligence and physiological activity. In one study (1955), he found that persons rated as more

primary functioning (quick, impulsive, variable, stimulable) possessed higher alpha frequencies than persons rated as more secondary functioning (slow, cautious, steady, hyperactive). In a second study, using EEG measurement, subjects with higher alpha rhythms were found to use verbal motor imagery during thought processes; subjects with lower alpha rhythms were found to use visual imagery during thought processes. This finding supported the notion that differentiation between the verbal and performance sections of the Wechsler-Bellevue Intelligence Test is related to differences in alpha rhythms.

Normative Versus Ipsative Approaches

Traditionally most psychophysiological studies dealing with stress reactions have used normative approaches; that is, these studies have investigated inter-individual differences to stress stimuli. Opton and Lazarus (1967) have reviewed these studies and noted that "psychologically irrelevant constitutional differences" have led to a large amount of error variance. They have also pointed out that individuals vary in number of sweat glands; that psychophysiological levels and responsivity vary tremendously among individuals, and that electrical skin conductance has a large heredity component. Other factors such as the Law of Initial Values

and stimulus-response specificity have further contributed to excessive error variance. As a result of this evidence, Opton and Lazarus have advocated an ipsative approach in which all subjects are exposed to a variety of stress conditions. In proposing this approach, they contended that the real question is "not whether a given subject with some trait or personality is highly or minimally aroused under some one stress stimulus, but whether he reacts more strongly to one than the other." Therefore, the subject serves as his own control and irrelevant factors are held constant over several stress conditions. For example, Alfert's (1965) comparative study of vicarious and direct threat treatments was subjected to ipsative and normative analysis, with the result that many more relationships between a personality questionnaire and stress reactions occurred with the ipsative approach. Furthermore, subjects who responded differentially to stress conditions described themselves in a more consistent and plausible fashion.

Affect Simulation

Basic studies involving the use of audio-visual procedures to study the effects of self-confrontation upon self-awareness (Nielsen, 1962) and to gain knowledge about underlying cognitive and affective states in human interaction (Bloom, 1954) have led to

training and therapy programs for the development of communication skills in mental health workers (Berger, 1970; Ivey, 1969; Kagan et al., 1967). The underlying assumption in the use of video procedures is that visual self-confrontation of one's verbal and non-verbal behaviors will accelerate the process of self-awareness and the development of more effective interpersonal behaviors (Kagan et al., 1969; Nielsen, 1962). Systematic studies have been designed which validate the use of these techniques in a variety of settings (Archer, 1971; Schauble et al., 1970).

One of these training programs, called Interpersonal Process Recall (IPR), uses a structured recall session to stimulate and accelerate recall of counselor-client interactions (Kagan et al., 1967). In an attempt to make the IPR procedure more effective with the kinds of real life threats a client encounters, a series of films was developed which simulate various kinds and degrees of basic emotions (Kagan, 1969; Kagan and Schauble, 1969; Kagan and Danish, 1969). These authors reasoned that by self-observation of one's video taped reactions to a series of planned threatening behaviors, therapy could be accelerated.

Actors were trained to direct basic emotions at an imaginary person beyond the camera so that the viewer would observe the actor as if he were a real person talking directly to

him. The vignettes portrayed interpersonal confrontations of affection-seduction or rejection-anger. These emotions ranged from very subtle to very intense levels. Four basic emotions are presented.

> 1. Hostility: The emotions take an "I reject you" tone, progressing from a very subtle, tolerant tone in the first scene to an intense expression of hostility in four separate scenes.
> 2. Affection: This series of five scenes proceeds from a warm, cordial acceptance to very obvious attempts at seduction.
> 3. Fear of hostility: This four-scene series portrays a response of "You've rejected me; you've hurt me," beginning with a mildly hurt reaction and culminating in a scene wherein the actor indicates he is emotionally devastated by something the client has said or done.
> 4. Fear of affection: This series of four scenes portrays a response of "Please stay away; your overtures scare me," beginning with a smiling "No, thank you" reaction and culminating in hysterical outrage. (Kagan and Schauble, 1969)

The films are shown to subjects who are instructed to imagine the person (actor) is talking personally to them. The subject's reactions can be video taped and physiological reactions can also be recorded. A recall session is conducted after the initial viewing by a specially trained recall worker and during this session the vignettes are replayed and the subject is asked to recall his initial feelings and thoughts about the simulation.

Most subjects have related to these vignettes as if they were real interpersonal encounters. Further research has indicated that the affect simulation procedure is a potent tool in combination

with the basic IPR technique (Schauble, 1970) or as a treatment by itself (Danish and Brodsky, 1970). The use of physiological feedback (HR and SC) has been suggested as an additional self-instructional methodology by Kagan and Schauble (1969). Recently a series of pilot studies have taken place (Archer, 1971) , whereby SC and HR measures were incorporated as feedback devices along with the traditional IPR methodology and the use of the affect simulation films. The authors found clinical evidence which gives some support to the stimulus-response specificity theory mentioned earlier, in that they found that certain subjects not only exhibited an increased HR but a decreased sweat rate as well during the recall session when they reported not being emotionally involved with the affect simulation films. Most subjects exhibited general patterns of rapid increases and decreases in sweat activity which accompanied rapid shifts in increased openness or lack of openness. Some subjects revealed little physiological reactivity at all, but showed frequent increases in sweat activity and decreases in cardiac activity. Applications to known groups, for therapeutic intervention, for personal therapy, and for computer assisted instruction are recommended by these authors.

The use of simulated emotions has been criticized by Sternbach (1966). He has maintained that it is difficult to induce

real-life situations in the psychophysiological laboratory loaded as it is with wires and gadgetry which are likely to create contaminating evidences of emotional arousal independent of any treatment procedures. Furthermore, most subjects who participate in psychological experiments come from general psychology classes where it is highly probable they have received some information about stress experiments. Films have been also criticized by Sternbach as being seldom successful in differentiating responses. His explanation for this observation was based upon Lacey's (1959) findings. Regardless of the content of the film, the subject was forced to attend to it. Even if the situations approximate real-life emotions which the subject rejects, he must continue his activity of perceiving with its concomitant stimulus enhancement responses. Thus, any other emotions which are felt (e.g., identification) must struggle for expression against the ongoing process of attending. Moreover, when the changes are in the opposite direction (e.g., a threatening feeling), Sternbach noted that "minimal" or "paradoxical" responses may be observed. These results suggest that it is difficult to discriminate between attending behaviors and emotional involvement.

The major assumption of the effectiveness of the affect simulation films that most subjects become personally involved in

these "encounters" as if they were real life experiences has been challenged by other researchers also. Findings from studies done by Kaplan et al. (1963) have suggested that a pre-existing "set" or tacit relationship may be of fundamental importance in creating GSR differences. Those individuals with positive or negative feelings toward one another had greater GSR responses than those who had neutral feelings towards each other. But Nowlin et al. (1968) have shown that stress within an interpersonal situation generates physiologic response (increased HR) even if the individuals are unknown to one another and lack pre-existent "like" or "dislike" toward the other person. Moreover, Nowlin found that a greater GSR was present even if a group member did not actively participate in a stressful situation. The fact that Kaplan used the GSR measure and that Nowlin used plasma free fatty acid and heart rate may account for the discrepant results.

Grossman (1971) used limb tremor response to compare college students' reactions to hostile scenes and neutral information communication. The vignettes he used for the hostile condition were adaptations of the Kagan affect simulation films and similar to the ones (rejection-anger) used in the present study. He also administered a questionnaire to determine each subject's degree of threat, involvement, and tenseness. Several interesting findings

emerged from his study. Grossman found that experienced threat differences in limb tremor level did not correspond with the stimulus tape difference. That is, males in the hostile condition and females in the neutral condition showed a less experienced threat than females in the hostile condition and males in the neutral condition. Grossman interpreted this result as providing some confirmation for the view that college age males are reluctant to admit being threatened or scared.

Grossman also found a significant difference between the attention and rest periods. For example, during attention, limb tremor responses tended to be inhibited, whereas during rest the tremor responses tended to be much less inhibited. This finding provides additional support for a somatic inhibition model of attention (Obrist et al., 1970). A further implication is that more attention is given to hostile vignettes and greater physiological activity occurs to hostile content than to neutral content.

Teitsma (dissertation in progress) is using the same films and physiological measures used in the present study to study alcoholics and nonalcoholics.

Related Studies of Threat and Stress

An extensive review of the literature into psychological and physiological factors associated with stress situations and threat

stimuli has been written by Lazarus (1966). In reviewing the field of stress he has proposed that over inclusive terms like stress be abandoned in favor of "separate terms that connote specific conditions and processes. . . ." He argued that "stress be used only as a generic term for psychological, sociological and physiological phenomena." He distinguished psychological stress from other types of stress analysis by the intervening variable of threat. Threat, according to Lazarus, implies a state in which the individual anticipates an encounter resulting in direct or indirect harm to himself. Cues which determine the degree of harm from a threatening situation are evaluated by the "cognitive process of appraisal." Appraisal depends on the "characteristics of the stimulus condition and psychological factors within the individual such as beliefs, motives, intelligence, education and life style." Special processes, called coping processes, are designed to reduce or eliminate the anticipated harm from the threatening stimulus. These coping processes depend on cognitive factors. Cognitive activity related to coping is called secondary appraisal and three factors influence this process: "degree of threat, factors in the stimulus configuration, and factors in the psychological structure." The particular coping strategy adopted is based on secondary or cognitive appraisal by the individual to master the threatening situation. The consequences of the

coping strategy used may be "affective experiences, psychomotor manifestations, alterations in adaptive functioning or physiological reactions" (Lazarus, 1966).

According to Lazarus (1966), degree of threat is a function of the amount, imminence, and likelihood of anticipated harm.

Lazarus and his colleagues have conducted a substantial amount of research into physiological factors associated with cognitive appraisal to threatening stimuli. A series of films showing graphic examples of physical harm have been used as the standard stimuli (Lazarus et al., 1962). Physiological stress reactions (increased skin conductance and heart rate) resulted. In a later study Speisman et al. (1964) altered the beliefs about the threatening stimuli by setting up three different sound tracks for the same film, one enhancing the traumatic effects of the film, a second encouraging the viewer to deny the harmful effects of the film, and a third encouraging an intellectual or detached view of the film. The trauma condition significantly increased physiological activity; the other two conditions significantly reduced the disturbance. In addition, for the denial and intellectual conditions, if the attitude encouraged by the statements was compatible with the subject's defensive style, then the coping behavior was more effective than if it was not the preferred defensive style. Speisman used MMPI

Scales to assess ego-defense dispositions of the S's as potential determinants of the effectiveness of the defensive sound tracks in reducing threat. Airline executives were oriented toward denial type defenses, students toward intellectualization. It is important to note that these films are scenes of lacerations and hence are examples of various threats and thus refute the position of Sternbach (1966) in which he stated that films had little effect in differentiating emotions.

Alfert (1965) compared direct threat situations with Lazarus' vicarious threat film. The direct threat condition was the anticipation of a painful electric shock. Subjects received both treatments. Her results provided strong evidence that the dynamics of vicatious and direct threat are comparable. The correlation of threat and stress reactions was substantial; that is, subjects who reacted most to one treatment tended to react similarly to the other treatment.

These studies have demonstrated that cognitive appraisal is an important factor in the production and reduction of threat and stress reactions. The major fault with the Lazarus studies is that they did not use interpersonal situations as treatments, making comparisons with the affect simulation films developed by Kagan

difficult to ascertain. In the Lazarus films the nature of the threat is clearly external to the person. In the Kagan films, enough ambiguity exists even in the more blatant ones, so that the viewer has a very wide range of ways in which he may perceive, interpret, and cope with the stimuli. Nevertheless, the notions of coping styles and cognitive appraisal are important factors to consider with known personality groups such as the ones selected for this study. The interpretations that thinkers, feelers, high empathizers, and low emphathizers give to interpersonal interactions may well determine the direction and magnitude of physiological responses. The willingness to explore one's personal reactions to emotional situations is probably also related to coping style.

Psychological Measures

Affective Sensitivity Scale-- Form C (A. S. S.)

This scale was designed to measure the ability to identify the immediate affective state of another (Kagan et al., 1967). It requires the subject to watch short segments from actual counselor-client interviews and to answer a series of multiple choice questions regarding the client's feeling about himself and about the counselor. Reliability figures have been reported to range from .53 to .77.

The scale has received wide usage in counselor training programs as a measure of change in emphatic perception (Greenberg et al., 1969; Schauble et al., 1970; Kagan et al., 1967; Saltmarsh, 1971). See Appendix A for an illustration of the format of the A. S. S.

Myers Briggs Type Indicator (MBTI)

This instrument is a personality inventory with a multiple choice format. It is related to Jung's theory of four basic personality types.

1) Extraversion-Introversion (EI): whether a person prefers to direct his mental activities toward the external world of people and things or towards the inner world of concepts and ideas;

2) Sensing-Intuition (SN): whether the subject prefers to perceive his world in a factual, realistic way or to perceive inherent imaginative possibilities;

3) Thinking-Feeling (TF): whether the individual prefers to arrive at decisions by logical analysis or by appreciating personal and interpersonal subjective values; and

4) Judgment-Perception (JP): whether the subject prefers to take a judgmental attitude or an understanding perceptive attitude toward his environment. (Myers-Briggs, 1962)

The indicator has been used with high school and college students in diagnosis, in selection and placement, in personal counseling and has received wide usage in a variety of nonacademic settings as well. (Only the thinking-feeling scale on the MBTI is used in this study.) Reliability coefficients for the TF index range

from .60 to .86 with seniors in high school and college students. Myers (1962) notes that the lower coefficients reflect the fact that the development of judgment is one of the slowest and most reluctant achievements in the process of growing up. (See Appendix B for TF Scale.)

Self-Exploration Scale

A considerable amount of research has been obtained to suggest that self-exploration behavior is a highly desirable process behavior in counseling and psychotherapy (Carkhuff, 1967). Carkhuff has regarded self-exploration tendencies as critical aspects of personal learning or relearning. Effective learning or relearning in Carkhuff's words "involves the development or reorganization of personal constructs and cosmologies reflecting the individual's uniqueness in relation to his world" (1969). The more self-actualized a person is, the greater the relationship between self-exploration and self-understanding. But Carkhuff has recognized that self-exploration and self-understanding are not equivalent processes and so there can be no expectation that self-exploration automatically leads to self-understanding. The Self-Exploration scale has been used in mental health counselor training programs with results showing that "higher functioning persons are

also disposed to exploring themselves at 'higher levels' and gain the most from a training experience" (Carkhuff, 1969).

Implications of Previous Research

The body of data reviewed in this chapter clearly indicates that substantial physiological activity occurs in the presence of stressful stimulation. Two major theories which purport to explain physiological correlates of emotional arousal were reviewed. The first theory can be summarized by labeling it as one of general activation in that exposure to threatening stimuli increases all physiological activity. The second major theory, called stimulus-response specificity, proposed that individual patterns occur relative to the particular characteristics of the stimulus. Specifically, inverse relationships between ESC and HR occur to different stimuli. It is evident from the review that the general activation theory which has dominated and guided psychophysiological investigations is not completely adequate for explaining all situations.

In reviewing the literature on specific physiological measures correlated with emotional arousal, it appears that heart rate, electrical skin conductance, and respiratory rate have been used most extensively and are viewed as the most sensitive, economical, and easiest to use. A growing body of evidence has demonstrated

the utility of combining ESC and HR measures so that more discriminating measurements can be made of inter- and intra-subject reactions (Opton and Lazarus, 1967). Moreover, these measures, particularly respiratory rate, have been used in attempts to identify personality types.

While there is an abundance of experimentation on how subjects react to real or imagined physical pain or direct or indirect threats, little or no evidence exists on how certain individuals react to interpersonal emotions. A new technique called affect simulation was reviewed and psychological evidence was found that the simulated presentations of basic emotions of affection-seduction and rejection-anger to subjects became a real experience for most of them. Furthermore, the literature has shown that certain physiological patterns have emerged from subjects' responses to these films, which partially support the stimulus-response specificity theory. Unfortunately these studies did not determine what psychological characteristics, if any, distinguished subjects in their response patterns.

There is a lack of data on how specific personality types respond to simulated emotional encounters. This study will analyze the physiological and psychological reaction of two basic personality types called thinkers and feelers, and also high and low perceptual

empathizers and high and low scorers on a self-exploration scale to viewing scenes from the affect simulation films.

CHAPTER III

DESIGN

Sample

All subjects were undergraduate male students enrolled in either an introductory psychology course (Psychology 170) at Michigan State University or in an upper level undergraduate education course. Thirty-two subjects were students in the introductory psychology class; eight subjects were students in the upper level education class. Subjects were selected from volunteers. The subjects from the introductory psychology course received special credit for their participation in the experiments. The subjects from the education class volunteered on the basis of an announcement in class. Forty-five percent were freshmen, 30 percent were sophomores, 17.5 percent were juniors, and 7.5 percent were seniors. None of the subjects had been exposed to psychophysiological experiments prior to this study. None reported any serious abnormalities in physiological functioning. The experiment was conducted during late summer and early fall to control for possible seasonal variation in skin conductance (Wenger, 1943).

Selection Instruments

The tests used in the initial selection process were the Myers-Briggs Type Indicator (MBTI) and the Affective Sensitivity Scale (A. S. S.). These instruments have been described in detail in Chapter II.

Posttest Measure of Self-Exploration (SE)

This scale is a process scale derived from client-centered procedures in counseling and psychotherapy. It has been reviewed in Chapter II.

Experimental Design

A balanced repeated measures, fixed effects design with levels of empathizers crossed with thinkers and feelers was used. Subjects served as their own controls. Each subject (S) was exposed to eight experimental trials. Each trial consisted of a rest (R) period, an orientation (O) period, and a vignette (V). Trials were crossed with all variables except vignettes. (See Table 3.1 for a diagram of the design.)

Selection Procedures

Subjects were administered the A. S. S. and the MBTI several days before the experiment in order to minimize interaction

Table 3.1. -- Experimental design.

		Subjects	T_1			T_2			T_3			T_4			T_5			T_6			T_7			T_8		
			R	O	V_1	R	O	V_2	R	O	V_3	R	O	V_4	R	O	V_5	R	O	V_6	R	O	V_7	R	O	V_8
FEELERS	Low Empathizers	S1 ⋮ S10																								
	High Empathizers	S11 ⋮ S20																								
THINKERS	Low Empathizers	S21 ⋮ S30																								
	High Empathizers	S31 ⋮ S40																								

between these instruments and the effects of the stimulus film or physiological reactivity and/or the posttest.

On the basis of the raw scores from the MBTI, each subject was assigned to either the thinker or the feeler category. This part of the selection process was terminated when 20 subjects had been selected for each category. Fifty subjects were initially tested. Several subjects were eliminated because of recording difficulties and an attempt was made to retain only those subjects with scores greater than the tenth percentile on the MBTI. No restrictions were placed on the upper limit of the percentile range for either category (i.e., one subject in the thinker category had a score at the fourth percentile).

Using a median split method, all 40 subjects were divided into "high" and "low" empathizers. Then, the number of "high" and "low" empathizers in the thinker and feeler categories respectively was determined. (Fortuitously each category was comprised of 10 high and 10 low empathizers so that equal cell sizes were obtained.) Scores on the A.S.S. ranged from 14 to 46. Subjects with scores between 14-30 were classified low empathizers. Subjects with scores between 31-46 were classified high empathizers. (See Appendix D for distribution of scores on MBTI and A.S.S.) No appropriate norms are available for the MBTI or the A.S.S. so

it is not possible to determine if this sample is representative of the general population of college students.

Rater Training Procedures

Two raters were trained in the use of the Self-Exploration Scale. During the training session, two tapes were played of subjects not used in the study. The tapes were stopped after each vignette and each rating was compared and discussed until all five levels had been rated several times and consistent agreement occurred between the raters. Upon completion of the rating session, each rater was randomly assigned twenty tapes to rate. After rating these tapes, the raters exchanged tapes so that each tape was rated by each rater. The raters were not acquainted with the subjects nor were they aware of which subjects were thinkers-feelers, or high or low empathizers. (See Appendix C for Self-Exploration Scale.) In order to determine the reliability of the average rating, a Hoyt's analysis of variance procedure was used (1967) which resulted in an r of .80. This r was the average of all eight vignettes and is regarded suitable for appropriate analysis of the Self-Exploration Scale.

Stimulus Vignettes

Two separate emotions were portrayed in the eight vignettes. They were affection-seduction and rejection-anger. Four scenes of rejection-anger and four scenes of affection-seduction were portrayed by a male or female actor. These scenes ranged from mild to strong in emotional intensity. They are described in the order they appear in the experiment in Appendix E.

Preparation of the Subjects

Each subject was informed by letter of the specific preparations he was to make before the treatment. (See Appendix F.) When the subject arrived for the experiment the physiological equipment was connected to him according to the following procedures. A four-channel Grass Polygraph Recorder (Model 50) was used to register HR, ESC, and f.

1. Prior to connecting the physiological apparatus, each subject washed his hands with a mildly abrasive soap, rinsed and dried them.
2. Two copper electrodes of five centimeters diameter were used to measure heart rate. One electrode was attached to the sternum and one electrode was attached just below

the left breast. Electrodes led to a Heart Rate Monitor and then to the Polygraph. A heart rate monitor and stimulator were used to monitor HR and to calibrate the heart rate recorder. The relationship between heart rate and chart recording is reported in Appendix G.

3. In order to record skin conductance, one electrode was attached to the left palm and the other attached just below the left elbow on the volar side. Each electrode was connected to a Hagfors bridge, which was connected to the Polygraph.
4. A mercury in rubber strain gauge attached to an elastic belt was wrapped around the lower rib cage and tightened to 10-20% of its original length. The strain gauge was connected to a Plethysmograph and then to the Polygraph.
5. The experimental room was kept between 68-72 degrees F.

Treatment Procedures

Phase I

Each subject was given the following set of instructions:

Please make yourself comfortable and try to relax for the next few minutes. This will allow the paste to make good contact with the skin. You are going to watch a series of short scenes on the television in front of you. Try to imagine that the person on the screen is talking directly and personally to you as if he were in this very room. After each scene, you will be given a

period of rest. During this time, try to remove yourself from the previous scene as much as possible. Just before the next scene begins, you will be notified.

Phase II

After allowing the subject several minutes to relax, the physiological measurement portion of the experiment was conducted. It consisted of presenting eight vignettes. Each vignette was preceded by a rest period one minute and forty-five seconds long and an alert period fifteen seconds long following the rest period. All together there were twenty-four time periods in this part of this study.* The subjects were specifically asked at the beginning of each rest period to try to relax.

At the beginning of each alert period, a bell was rung and the subject was told that the scene was about to begin. Heart rate, respiratory rate, and electrical skin conductance were recorded during all twenty-four time periods.

Phase III

After the last scene, the physiological equipment was disconnected from the subject. The subject was shown each of the eight vignettes again. A special recall process was used.

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*The twenty-four time periods consisted of a rest period immediately following each vignette; an orientation period immediately preceding each vignette; and eight vignettes.

1. A tape recorded voice provided instructions to each subject about the recall process.
2. Each subject received a printed version of the instructions so that he could refer to them throughout the recall process. (See Appendix H for a copy of these instructions.)
3. At the end of each scene he was asked to follow the written and spoken instructions in recalling and summarizing his reaction to the initial viewing session.

Hypotheses

These hypotheses are related to an elaboration of the findings of Archer et al. (1970) and the assumptions presented in Chapters I and II on thinkers and feelers. No directional statements are made regarding the effects of respiratory rate or self-exploration ratings.

Hypotheses 1, 2, 4, 5, 7, 8, 10, and 11 will be tested for

1) each rest period preceding each vignette;
2) each orientation period immediately following each rest period and immediately preceding each vignette;
3) each of the eight vignettes portraying affection-seduction or rejection-anger.

Hypotheses 3, 6, and 9 refer to the second viewing of the vignettes without physiological recording.

Hypothesis 1) Between Feelers and Thinkers on HR:

Feelers will have a lower $\overline{HR}$ than Thinkers across treatments.

$$H_1: \overline{HR}_{(F)} < \overline{HR}_{(T)}$$

Hypothesis 2) Between High Empathizers and Low Empathizers on HR:

High Empathizers will have a lower $\overline{HR}$ than Low Empathizers across all treatments.

$$H_2: \overline{HR}_{(HE)} < \overline{HR}_{(LE)}$$

Hypothesis 3) Between levels of Self-Exploration ratings on HR:

There will be no correlation between levels of Self-Exploration ratings and $\overline{HR}$.

$$H_3: \rho_{E,\ \overline{HR}} = 0$$

Hypothesis 4) Between Feelers and Thinkers on ESC:

Feelers will have a higher $\overline{ESC}$ than Thinkers across treatments.

$$H_4: \overline{ESC}_{(F)} > \overline{ESC}_{(T)}$$

Hypothesis 5) Between High Empathizers and Low Empathizers on ESC:

High Empathizers will have a higher $\overline{ESC}$ than Low Empathizers across treatments.

$$H_5: \overline{ESC}_{(HE)} > \overline{ESC}_{(LE)}$$

Hypothesis 6) Between levels of Self-Exploration and ESC:

There will be no correlation between levels of Self-Exploration ratings and $\overline{ESC}$.

$$H_6: \rho_{E,\ \overline{ESC}} = 0$$

Hypothesis 7) Between Feelers and Thinkers on Respiration Rate:

There will be no significant difference between Feelers and Thinkers on f across treatments.

$$H_7: f_{(F)} = f_{(T)}$$

Hypothesis 8) Between High Empathizers and Low Empathizers on Respiration Rate:

There will be no significant difference between High Empathizers and Low Empathizers on f across treatments.

$$H_8: f_{(HE)} = f_{(LE)}$$

Hypothesis 9) Between levels of Self-Exploration and f:

There will be no correlation between levels of Self-Exploration ratings and $\overline{f}$.

$$H_9: \rho_{E,\ \overline{f}} = 0$$

Hypothesis 10) Between Feelers and Thinkers and Self-Exploration:

During the replay, Self-Exploration ratings will be greater for Feelers than for Thinkers across vignettes.

$$H_{10}: M_{(F)} > M_{(T)}$$

Hypothesis 11) Between High Empathizers and Low Empathizers on Self-Exploration:

During the replay, Self-Exploration ratings will be greater for High Empathizers than for Low Empathizers across vignettes.

$$H_{11}: M_{(HE)} > M_{(LE)}$$

Analysis of Data

The independent variables in this study were divided into two groups:

1. Between subject variables which included:
   a. Thinker-feeler types
   b. High and low empathizers

2. Self-Exploration

3. Stimulus variables which included:

   a. Type of stimulus: rejection or seduction

   b. Level of emotion: low or high

   c. Sex of actor: male or female

   d. Time periods: rest, alert, vignette

   e. Sequence of films.

The dependent variables were physiological responses of HR, f, ESC, and Self-Exploration.

A total of eleven measurements were recorded during each of the twenty-four conditions of the initial viewing (eight rest periods, eight orientation periods, eight stimulus periods). These are listed in Table 3.2. An average score for each of the eleven measurements was calculated per condition. $\overline{HR}$ and $\overline{ESC}$ were determined by adjusting a straight edge parallel to a horizontal line of the chart in such a way that half of the tracing fell above the top edge of the straight edge. That line was read from the chart as the average for that variable in that period. Each of the twenty-four time periods was measured in the same way. See Figures 3.1 and 3.2 for an illustration of this method.

Respiratory rate was determined by counting the number of peaks per period, dividing that number by the number of seconds

Table 3.2. -- Physiological measures recorded for $\overline{HR}$, $\overline{ESC}$, and f.

HR	f	ESC
1. Average/period	5. Rate/period	8. Average/period
2. Upper limit/period	6. Number of apneas/ period[b]	9. Upper limit/period
3. Lower limit/period	7. Average length of apneas/period	10. Lower limit/period
4. Peaks[a]		11. Number of peaks/ period[c]

[a]One HR peak was arbitrarily defined for this study as being any response movement greater than 5 millimeters/5 seconds.

[b]One apnea was defined as a duration of 5 seconds or longer at the top or bottom of a peak.

[c]One ESC peak was any deflection observed by the naked eye.

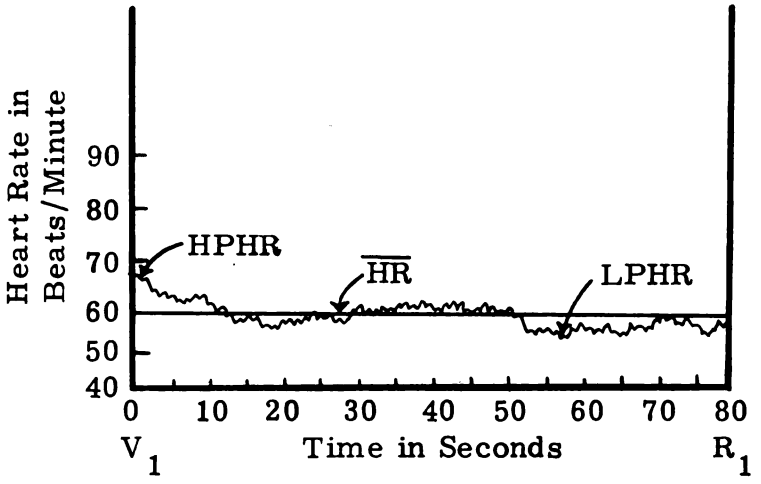

Figure 3.1. --Illustration of how $\overline{HR}$, HPHR, and LPHR were determined per period.

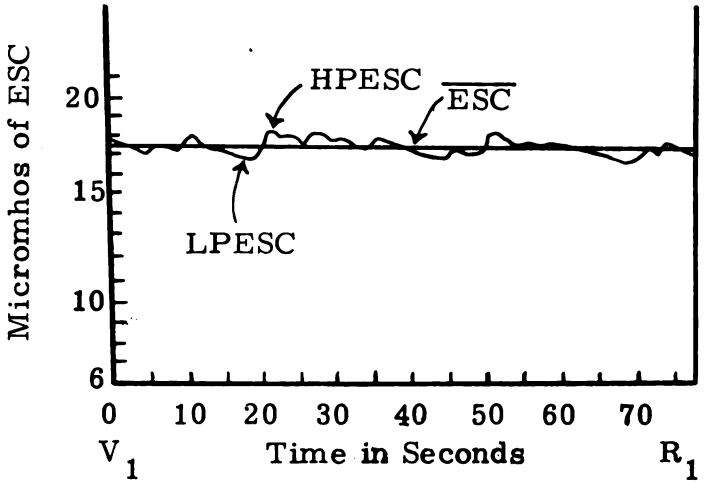

Figure 3.2. --Illustration of how $\overline{ESC}$, HPESC, and LPESC were determined per period.

in that period and multiplying by sixty seconds. The resulting figure was respiratory rate per minute. (See Figure 3.3 for an illustration of this procedure.)

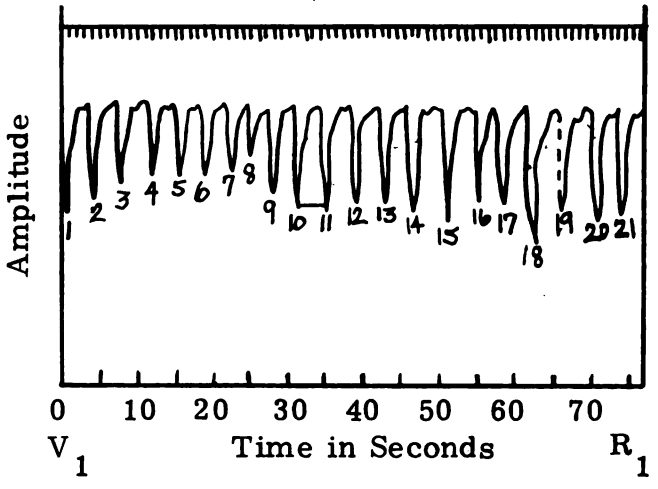

Figure 3.3. --Illustration of how f was determined per period.

Eight two by two fixed effects repeated measures analyses of variance were used to test hypotheses 1, 2, 4, 5, 7, 8, 10, and 11. A Pearson product moment correlational analysis was used to test hypotheses 3, 6, and 9. Alpha level was set at .05. Only $\overline{HR}$, $\overline{ESC}$, and f were used to formulate the hypotheses because of the major interest in average change per variable.

In order to prepare the tapes of recall for the data analysis, the judges' ratings for each of the eight summaries per subject were combined and averaged to produce one score.

CHAPTER IV

ANALYSIS OF RESULTS

An analysis of the data and a discussion of the results are presented in this chapter. Research hypotheses are restated and analyses of the results are presented.

For hypotheses 1, 2, 4, 5, 7, 8, 10, and 11 several two by two fixed effects repeated measures analyses of variance were done. For each dependent variable in each of the three experimental conditions (rest, orientation, and vignette), a separate repeated measures ANOVA was done. Each ANOVA was a 2 (thinker-feeler) $\times$ 2 (high-low empathizers) $\times$ 8 (vignettes) with vignettes representing the repeated measures dimension. Hypotheses 10 and 11 were tested for the vignette condition only. Pearson-product moment correlations were computed to test hypotheses 3, 6, and 9. Only average values for HR, ESC, and f were considered in the formulation of hypotheses 1, 2, 4, 5, 7, and 8. F values for the remaining dependent variables are given in Appendix I. The tables

which report the repeated measures results do not include the within subject' s comparisons.

Slope estimates and rank order estimates were calculated for each group on each physiological measure.

Alpha level was set at .05.

Hypotheses for Average Heart Rate

Hypothesis 1) Between Feelers and Thinkers on HR:

Feelers will have a lower $\overline{HR}$ than Thinkers across treatments.

$$H_1: \overline{HR}_{(F)} < \overline{HR}_{(T)}$$

Hypothesis 2) Between High Empathizers and Low Empathizers on HR:

High Empathizers will have a lower $\overline{HR}$ than Low Empathizers across treatments.

$$H_2: \overline{HR}_{(HE)} < \overline{HR}_{(LE)}$$

Hypothesis 3) Between levels of Self-Exploration on HR:

There will be no correlation between levels of Self-Exploration ratings and $\overline{HR}$.

$$H_3: \rho_{E,\ \overline{HR}} = 0$$

Table 4.1. --Summary of repeated measures analysis of variance of rest, orientation, and vignette conditions on average heart rate of thinkers, feelers, low empathizers, and high empathizers. *

Source	df	MS	F
Rest			
Style (Thinker or Feeler) (B)	1	372.169	.45
Empathy (High or Low) (C)	1	1465.900	1.78
Style × Empathy (BC)	1	204.640	.24
Error (b)	36	821.726	
Orientation			
Style (Thinker or Feeler) (B)	1	1041.485	1.30
Empathy (High or Low) (C)	1	1975.575	2.47
Style × Empathy (BC)	1	261.545	.33
Error (b)	36	798.807	
Stimulus			
Style (Thinker or Feeler) (B)	1	692.076	.99
Empathy (High or Low) (C)	1	1468.898	2.10
Style × Empathy (BC)	1	225.456	.32
Error (b)	36	697.923	

*With 1, 36 df need $F \geq 4.08$ to reject (α .05).

Results for Heart Rate

Style Versus Empathy

Table 4.1 contains the results of the analyses of variance on average heart rate for the rest, orientation, and stimulus conditions for thinkers and feelers and high and low empathizers. F tests for rest, orientation, and vignette conditions indicate that hypotheses 1 and 2 are not supported at alpha = .05. Feelers do not have significantly lower average heart rates than thinkers across treatment within each condition. High empathizers do not have significantly lower heart rates than low empathizers. No interaction effects are significant. The specific alpha levels are reported in Table 4.2. Means for the groups are reported in Table 4.3.

Table 4.2. --Levels of significance for average heart rate, average electrical skin conductance, and respiratory rate for rest, orientation, and vignette.

	HR			ESC			f		
	R	O	V	R	O	V	R	O	V
Style	>.25	>.25	>.25	>.25	>.25	>.25	>.25	>.25	>.25
Empathy	.19	.13	.16	>.25	>.25	.22	.11	.14	.19
Style × Empathy	>.25	>.25	>.25	>.25	>.25	>.25	.10	.35	.12

Table 4.3. --Means for all groups for $\overline{HR}$, $\overline{ESC}$, and f for rest, orientation, and vignette conditions.

$\overline{HR}$			$\overline{ESC}$			f		
R	O	V	R	O	V	R	O	V
68.5	69.8	67.4	14.9	15.0	15.3	14.7	15.4	15.5
66.2	66.2	64.5	12.3	14.7	15.5	14.8	12.5	12.5
69.5	70.4	68.1	11.5	15.5	15.9	15.4	11.8	11.7
65.2	65.5	63.8	15.7	14.2	14.8	14.1	16.1	16.2
71.4	73.1	70.4	13.5	16.1	16.6	16.0	14.0	13.8

Self-Exploration

Correlations of self-exploration and heart rate respectively for rest, orientation, and vignette conditions were -.01, .02, and .00. In order to be significant at alpha = .05 an r of ±.324 is necessary. Therefore, there is no significant correlation between levels of self-exploration and average heart rate.

Hypotheses for Average Electrical Skin Conductance

Hypothesis 4) Between Feelers and Thinkers on ESC:

Feelers will have a higher $\overline{ESC}$ than Thinkers across treatments.

$$H_4: \overline{ESC}_{(F)} > \overline{ESC}_{(T)}$$

Hypothesis 5) Between High Empathizers and Low Empathizers on ESC:

High Empathizers will have a higher $\overline{ESC}$ than Low Empathizers across treatments.

$$H_5: \overline{ESC}_{(HE)} > \overline{ESC}_{(LE)}$$

Hypothesis 6) Between levels of Self-Exploration and ESC:

There will be no correlation between levels of Self-Exploration ratings and $\overline{ESC}$.

$$H_6: \rho_{E,\ \overline{ESC}} = 0$$

Results for Electrical Skin Conductance

Style Versus Empathy

Table 4.4 summarizes the analyses of variance on average electrical skin conductance for the rest, orientation, and vignette conditions. F tests for rest, orientation, and vignette conditions indicate that hypotheses 4 and 5 are not supported at alpha = .05. Feelers do not have significantly higher average electrical skin conductance scores than thinkers across treatments for each condition. High empathizers do not have significantly higher average electrical skin conductance scores than low empathizers. Interaction effects are not significant. The specific alpha levels are

Table 4.4. -- Summary of repeated measures analysis of variance of rest, orientation, and vignette conditions on average electrical skin conductance of thinkers, feelers, low empathizers, and high empathizers. *

Sources	df	MS	F
Rest			
Style (Thinker or Feeler) (B)	1	557.700	.53
Empathy (High or Low) (C)	1	1421.930	1.36
Style × Empathy (BC)	1	146.165	.14
Error (b)	36	1053.475	
Orientation			
Style (Thinker or Feeler) (B)	1	635.121	.58
Empathy (High or Low) (C)	1	1421.057	1.30
Style × Empathy (BC)	1	160.121	.15
Error (b)	36	1090.568	
Stimulus			
Style (Thinker or Feeler) (B)	1	664.705	.62
Empathy (High or Low) (C)	1	1643.303	1.53
Style × Empathy (BC)	1	161.653	.15
Error (b)	36	1076.510	

*With 1, 36 df need $F \geq 4.08$ to reject ($\alpha = .05$).

reported in Table 4.2. Means for the groups are reported in Table 4.3.

Self-Exploration

Correlations of self-exploration and average electrical skin conductance respectively for rest, orientation, and vignette conditions were -.12, -.12, and -.11. In order to be significant at alpha = .05, an r of ±.324 was necessary. Therefore, there is no significant correlation between levels of self-exploration and average electrical skin conductance.

Hypotheses for Respiratory Rate

Hypothesis 7) Between Feelers and Thinkers on Respiration Rate: There will be no significant difference between Feelers and Thinkers on f across treatments.

$$H_7: \quad f_{(F)} = f_{(T)}$$

Hypothesis 8) Between High Empathizers and Low Empathizers on Respiration Rate:
There will be no significant difference between High Empathizers and Low Empathizers on f across treatments.

$$H_8: \quad f_{(HE)} = f_{(LE)}$$

Hypothesis 9) Between levels of Self-Exploration and Respiratory Rate:

There will be no correlation between levels of Self-Exploration ratings and f.

$$H_9: \rho_{E,\ f} = 0$$

Results for Respiratory Rate

Style Versus Empathy

Table 4.5 summarizes the analyses of variance on respiratory rate for the rest, orientation, and vignette conditions. F tests for rest, orientation, and vignette conditions indicate that hypotheses 7 and 8 are not rejected. Therefore, feelers and thinkers and high and low empathizers reflect no significant differences on their respiratory rates across trials for each condition. Interaction effects are not significant. The specific alpha levels are reported in Table 4.2. Means for the groups are reported in Table 4.3.

Self-Exploration

Correlations of self-exploration and respiratory rate respectively for rest, orientation, and vignette conditions were -.14, -.05, and -.05. In order to be significant at alpha = .05, an

Table 4.5. --Summary of repeated measures analysis of variance of rest, orientation, and vignette conditions on respiratory rate of thinkers, feelers, low empathizers, and high empathizers.*

Sources	df	MS	F
Rest			
Style (Thinker or Feeler) (B)	1	.210	.005
Empathy (High or Low) (C)	1	122.018	2.66
Style × Empathy (BC)	1	130.816	2.85
Error (b)	36	45.885	
Orientation			
Style (Thinker or Feeler) (B)	1	5.592	.08
Empathy (High or Low) (C)	1	148.922	2.25
Style × Empathy (BC)	1	63.101	.95
Error (b)	36	7.690	
Stimulus			
Style (Thinker or Feeler) (B)	1	3.240	.05
Empathy (High or Low) (C)	1	114.242	1.80
Style × Empathy (BC)	1	160.461	2.54
Error (b)	36	63.316	2.54

*With 1, 36 df need $F \geq 4.08$ to reject ($\alpha = .05$).

r of ±.324 was necessary. Therefore, there is no significant correlation between levels of Self-Exploration and respiratory rate.

Hypotheses for Self-Exploration

Hypothesis 10) During the replay, Self-Exploration ratings will be greater for Feelers than for Thinkers across treatments.

$$H_{10}: \quad M_{(F)} > M_{(T)}$$

Hypothesis 11) During the replay, Self-Exploration ratings will be greater for High Empathizers than for Low Empathizers across treatments.

$$H_{11}: \quad M_{(HE)} > M_{(LE)}$$

Results for Self-Exploration

Table 4.6 summarizes the analysis of variance of self-exploration for style and empathy. The F test for hypothesis 10 was significant at alpha = .05. Feelers had significantly greater mean scores ($p > .05$) on self-exploration ratings than thinkers across vignettes. Mean scores were 2.8 for feelers and 2.2 for thinkers. Hypothesis 11 was not statistically significant at alpha = .05; and, therefore, high empathizers do not differ significantly on self-exploration ratings from low empathizers. No interaction

effects were significant. The value of F required to support hypothesis 11 would be $p > .25$.

Table 4.6. --Summary of repeated measures analysis of variance of self-exploration on thinkers, feelers, low empathizers, and high empathizers.**

Sources	df	MS	F
Rest			
Style (Thinker or Feeler) (B)	1	24.365	7.84*
Empathy (High or Low) (C)	1	.399	.13
Style × Empathy (BC)	1	.007	.00
Error	36	3.116	

*Significant at $p < .05$.

**With 1, 36 df need $F \geq 4.08$ to reject ($\alpha = .05$).

Further Analyses

Two additional analyses were performed, a slope estimate and a rank order of the groups on each physiological variable. It must be noted that these analyses are very tentative and must be interpreted with caution since the tests of significance were not supported at alpha = .05.

Slope Analysis

An estimate of the slopes for each physiological variable and for each condition was calculated to provide further information on the physiological patterns among the four groups. Slope was defined as the change in the mean score on each physiological variable for each group from period 1 to period 8 of each condition divided by the difference of trial 8 and trial 1. For example, on $\overline{HR}$ for feelers during the rest condition, the formula was

$$\frac{\overline{HR}_{R8(F)} - \overline{HR}_{R1(F)}}{8 - 1}$$

This formula was used to determine the slopes which are reported in Table 4.7 for each group on each physiological variable during each condition.

Table 4.7 shows that F's and T's had similar slopes during the rest and orientation and vignette conditions for $\overline{HR}$ and f. These slopes for F's and T's were moderately negative. The slopes for F's and T's were moderately to highly positive on $\overline{ESC}$ during all conditions, and F's slopes were approximately twice as large as T's during the rest and vignette conditions. Relatively little difference occurred between F's and T's on $\overline{ESC}$ during the orientation period.

Table 4.7. --Slope estimate of F's, T's, LE's, and HE's on each physiological variable for rest, orientation, and stimulus vignette.

	$\overline{HR}$			$\overline{ESC}$			f		
	R	O	S	R	O	S	R	O	S
F	.07	.10	-.49	.61	.54	.47	-.10	-.24	-.10
T	-.04	.13	-.27	.31	.46	.23	-.06	-.29	-.20
LE	.26	.00	-.49	.49	.41	.46	-.11	-.30	-.16
HE	-.34	.25	-.27	.46	.51	.36	-.04	-.34	-.14

Similar slopes occurred for LE's and HE's on $\overline{ESC}$ and f for all conditions. Slopes for $\overline{ESC}$ were moderately positive, for f low negative to moderately negative. On $\overline{HR}$, considerable variability existed between LE's and HE's during all conditions. During the vignette condition, however, their slopes were both negative and with less difference between them than during the rest and orientation conditions.

On $\overline{HR}$, F's, T's, and HE's showed an increase in their slopes from rest to orientation and a large drop during the vignette condition. LE's slopes decreased from rest to orientation to vignette. Identical slopes are reported for F's and LE's and for T's and HE's.

Little difference occurred among the four groups on slopes. That is, all their slopes were moderately high. For groups except LE's, slopes during the vignette condition were lower than during the rest and orientation. With the exception of T's, slopes during the vignette conditions are highly similar.

On f, low to moderately negative slopes were characteristic among the groups during all conditions.

F's showed the largest slopes than the other groups on $\overline{ESC}$.

In summary, the data from Table 4.7 seem to show

1) that F's were more like LE's on $\overline{HR}$;
2) that T's were more like HE's on $\overline{HR}$;
3) F's, LE's, and HE's had similar slopes on $\overline{ESC}$;
4) all groups had negative slopes on f and differ little from one another; and
5) F's had larger slopes than T's, LE's, and HE's on $\overline{ESC}$.

Rank Order Estimates

In order to determine how the groups ranked with one another on their physiological responses, a rank order estimate was determined. This was done by calculating each group's mean for each physiological variable for the eight vignette conditions

only and ranking each group from highest to lowest. These data are reported in Table 4.8.

Table 4.8. --Nonsignificant rank order of means of thinkers, feelers, low empathizers, and high empathizers on $\overline{HR}$, $\overline{ESC}$, and f across vignette conditions only.

$\overline{HR}$	Means	$\overline{ESC}$	Means	f	Means
LE	68.1	HE	16.2	LE	15.9
F	67.4	F	15.4	T	15.5
T	64.5	T	12.5	F	15.3
HE	63.0	LE	11.7	HE	14.8

It can be seen from the results that LE's are ranked first on $\overline{HR}$ and f, while HE's are ranked last. On $\overline{ESC}$, HE's are ranked first, LE's are ranked last. F's are ranked above T's on $\overline{HR}$ and $\overline{ESC}$, but are equal on f.

Summary

Several repeated measures analyses of variance were used to test eight of the eleven hypotheses (hypotheses 1, 2, 4, 5, 7, 8, 10, and 11). Hypotheses 1, 2, 4, 5, 10, and 11 were stated in directional form while hypotheses 7 and 8 were stated in null form. Hypotheses 3, 6, and 9 were expressed in correlational form. Only

hypothesis 10 was statistically significant at alpha = .05. For this hypothesis, feelers had significantly higher mean scores on self-exploration ratings across vignettes than thinkers.

The correlational analysis between self-exploration and $\overline{HR}$, $\overline{ESC}$, and f revealed no correlation significantly different from zero.

Slope estimates and rank order estimates of the groups for each physiological variable were presented, but must be regarded as tentative because of the nonsignificant results. The slope estimates seemed to indicate that F's are more like LE's on $\overline{HR}$, while T's are more like HE's on $\overline{HR}$. F's, LE's and HE's have similar slopes on $\overline{ESC}$. All groups show little difference on f. F's have larger slopes than T's, LE's and HE's on $\overline{ESC}$.

On rank order estimates, derived from averages for each group for each physiological variable during the vignette condition only, LE's had the highest $\overline{HR}$'s and f's; while HE's had the lowest $\overline{HR}$'s and f's. On $\overline{ESC}$, HE's had the highest $\overline{ESC}$; LE's the lowest $\overline{ESC}$.

A summary and conclusion of the study will be presented in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The purposes of this study were 1) to investigate physiological patterns of reactivity of thinkers, feelers, high empathizers, and low empathizers to a series of simulated emotions portrayed by actors on video tape, and 2) to determine levels of self-exploration among thinkers, feelers, high empathizers, and low empathizers as they recall their initial thoughts and feelings about the simulated emotions.

Current training procedures in the mental health professions have focused almost entirely on analyses of communication and covert thought processes in client-counselor interactions, but little or no attempt has been made to investigate what measurable physiological reactions occur as a trainee is exposed to basic emotions such as rejection or affection. The use of physiological feedback may increase a person's self-awareness and enable an improvement in personal effectiveness with certain emotions. The

data could also provide a greater understanding of how different personality types function in emotional situations. It is now evident that video tape procedures can be used to simulate real life emotions effectively (Kagan, 1971; Nielsen, 1962) and combined with sophisticated physiological recording devices, more effective training procedures may be developed which focus on physiological reactions as well as psychological reactions. In particular, heart rate, electrical skin conductance, and respiratory rate seem to offer promise as reliable indicators of emotional activation and deactivation.

There are two basic theories regarding physiological correlates of emotional arousal. One explanation is that a "general physiological activation" occurs in the autonomic nervous system to any and all threatening stimuli. Thus, autonomic variables such as heart rate, respiratory rate, and electrical skin conductance increase in all persons as they confront threatening situations. A second explanation, called "stimulus-response specificity," maintains that physiological processes operate uniquely in the presence of threatening situations so that heart rate, respiratory rate, and skin conductance may respectively increase or decrease depending on the nature of the stimuli, individual personality factors, and coping styles.

Findings by Lacey (1963) lend support to the "stimulus-response specificity" view, in that an inverse relationship between heart rate and electrical skin conductance has been observed among subjects as they were confronted with a series of simulated emotions portrayed by actors. Also a new methodology for the study of physiological reactivity has provided some support for the view (Archer et al., 1971).

However, evidence is lacking on how known personality groups react to emotional situations. This study tests the "stimulus-response specificity" view and tests hypotheses related to physiological differences between known personality groups when they are exposed to a series of simulated emotions.

Forty subjects from undergraduate psychology and education courses at Michigan State University were divided into four groups of "thinkers," "feelers," "low empathizers," and "high empathizers" on the Myers-Briggs Type Indicator and the Affective Sensitivity Scale using the grand median of each test. All subjects were exposed to the same treatment which consisted of viewing eight video taped scenes of two planned emotions: seduction-affection and rejection-anger. These emotions were portrayed by an actor and actress and varied in emotional intensity. Each scene

was preceded by a rest period and an alert period so that there was a total of eight rest periods, eight orientation periods, and eight stimulus vignettes. Heart rate, electrical skin conductance, and respiratory rate were recorded during all rest, orientation, and vignette conditions. After viewing these scenes, the physiological equipment was disconnected. The scenes were immediately shown to each subject again, and he was instructed to talk about his reactions to each scene.

Several fixed effects repeated measures analyses of variance were used to test eight of the eleven hypotheses. Each of the eight hypotheses was tested for rest, orientation, and vignette across all eight trials. A correlation analysis was used to test the remaining hypotheses. The hypotheses are listed below.

H_1 Feelers will have a lower $\overline{HR}$ than thinkers across treatments.

H_2 High empathizers will have a lower $\overline{HR}$ than low empathizers across treatments.

H_3 There will be no correlation between levels of self-exploration ratings and $\overline{HR}$.

H_4 Feelers will have a higher $\overline{ESC}$ than thinkers across treatments.

H_5 High empathizers will have a higher $\overline{ESC}$ than low empathizers across treatments.

H_6 There will be no correlation between levels of self-exploration ratings and $\overline{ESC}$.

H_7 There will be no significant difference between feelers and thinkers on f across treatments.

H_8 There will be no significant difference between high empathizers and low empathizers on f across treatments.

H_9 There will be no correlation between levels of self-exploration ratings and f.

H_{10} During the replay, self-exploration ratings will be greater for feelers than for thinkers across vignettes.

H_{11} During the replay, self-exploration ratings will be greater for high empathizers than for low empathizers across vignettes.

With the exception of hypotheses 7, 8, and 10, none of the hypotheses were supported at alpha = .05. However, all alpha levels were reported. Hypotheses 7 and 8 stated in null form were not rejected at alpha = .05. The result of hypothesis 9 indicated that feelers were rated significantly higher on a measure of Self-Exploration for all scenes than thinkers. The correlational analysis between levels of self-exploration and average heart rate, average electrical skin conductance, and respiratory rate revealed no correlation significantly different from zero.

Slope estimates and rank order estimates of the groups for each physiological variable were presented, but must be regarded as tentative because of the nonsignificant results. The slope estimates seemed to indicate that F's were more like LE's on $\overline{HR}$, while T's were more like HE's on $\overline{HR}$. F's, LE's, and

HE's had similar slopes on $\overline{ESC}$. All groups showed little difference from one another on f. F's had larger slopes than T's, LE's, and HE's on $\overline{ESC}$.

On rank order estimates, derived from averages for each group for each physiological variable during the vignette condition only, LE's had the highest $\overline{HR}$'s and f's; while HE's had the lowest $\overline{HR}$'s and f's. On $\overline{ESC}$, HE's had the highest $\overline{ESC}$; LE's had the lowest $\overline{ESC}$.

Conclusions

The results of this study do not provide conclusive evidence for the "stimulus-response specificity" theory. The only significant result occurred on the Self-Exploration Scale.

Feelers are more clearly open to exploring their reactions toward the vignettes than thinkers as evidenced in their significantly higher ratings on Self-Exploration. Research by Carkhuff (1969) has shown that the apparent small difference (F's 2.8, T's 2.2) is large enough to be a real difference. This result may be related to their general level of physiological activation which was numerically but nonsignificantly higher in most instances than the other groups.

Discussion

General Activation Versus Stimulus-Response Specificity

These findings do not provide conclusive evidence for stimulus-response specificity and therefore suggest a more detailed examination of both general activation and stimulus-response specificity explanations. Although differing in magnitude of responses (but nonsignificantly), the groups showed a remarkable similarity in their physiological patterns. There was a significant trial effect which suggests that over time both general activation and deactivation occurred. For $\overline{HR}$, the value of F (5.02) during the vignette condition was significant on both a liberal test ($F \geq 2.01$ with 7,252 d.f.) and a conservative test ($F \geq 4.08$ with 1,36 d.f.). For $\overline{ESC}$, during rest ($F = 5.30$) and orientation ($F = 4.97$) on both a liberal test ($F \geq 2.01$ with 7,252 d.f.) and conservative test ($F \geq 4.08$ with 1,36 d.f.) and during vignette ($F = 3.51$) on a liberal test ($F \geq 2.01$ with 7,252 d.f.) only. For f during orientation ($F = 3.53$) and vignette ($F = 3.58$) on a liberal test ($F \geq 2.01$ with 7,252 d.f.). Table 5.1 shows the means for the physiological variables. Both $\overline{HR}$ and f show general deactivation tendencies, while $\overline{ESC}$ shows general activation tendencies.

Table 5.1. --Means of entire sample for each condition across trials.

	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Average Heart Rate								
R	66.3	67.5	67.4	68.0	68.9	67.6	66.9	66.4
O	68.0	66.9	68.2	68.5	68.2	67.8	67.4	68.7
V_i	67.6	66.5	66.4	66.2	66.2	65.2	64.6	64.9
Average Electrical Skin Conductance								
R	11.5	12.3	13.1	13.5	14.3	14.3	15.0	14.8
O	12.0	12.8	13.4	14.0	14.6	14.6	14.9	15.3
V_i	12.3	12.9	13.4	13.8	14.5	15.0	14.7	14.8
Respiratory Rate								
R	15.4	14.5	14.4	14.8	14.2	14.8	15.1	14.9
O	16.5	15.6	14.8	14.1	14.2	14.8	14.8	14.2
V_i	16.1	15.2	15.1	15.0	15.3	15.3	15.8	15.1

These integrated responses support the "fight or flight" reaction pattern which constituted Cannon's general activation theory discussed in detail in Chapter II. General activation occurred in all the physiological variables, but particularly in ESC according to slope estimates. Some variation which occurred between the groups

on slope estimates may be accounted for in part by stimulus-response specificity or just error variance. This is particularly true for heart rate and respiration measures, where slopes vary within and across conditions. Several discrepant findings suggest questions related to stimulus-response specificity. Why is it that F' s and LE' s differ more on $\overline{HR}$ than F' s and HE' s in slope estimates during all conditions? Why do T' s and LE' s and T' s and HE' s show almost mirror images of one another on $\overline{HR}$ during the stimulus condition? For $\overline{ESC}$, why do T' s slopes differ from F' s, LE' s, and HE' s? These results apparently indicate a patterning of responses within the activated state which may provide some support for stimulus-response specificity. However, since the results were not statistically significant, this is only a speculation. But it is possible that both activation and stimulus-response specificity may exist.

Several other explanations may exist for the findings of this study. They will be discussed under separate sections.

Adaptation

According to Sternbach (1966), adaptation is "the diminution of responses to repetitive stimulation." It is somewhat analogous to the extinction of a learned response when reinforcement is

eliminated. Adaptation seems to occur during the vignette condition according to slope estimates which were calculated to determine the amount of change in the physiological variable over time. The significant trial effect noted in the previous section as well as the means from Table 5.1 for $\overline{HR}$ and f demonstrate this point. This is a puzzling result since the simulated emotions differ not only in type but in level. They are not monotonous or bland encounters. One explanation is that the vignettes were too long and fatigue occurred. But fatigue is not considered by psychophysiological researchers the same as adaptation, and, therefore, conclusive evidence for its existence has not been suggested by this study.

Explicit and Implicit Sets

Verbal instructions given to the subjects by an experimenter may predispose a subject to respond in a particular way. Typically initial experimental sessions are filled with anxiety, which may contribute directly to a higher level of activation. Respiratory rate measures in this study weakly support this notion, but heart rate and electrical skin conductance do not support it.

The specific purpose of the initial instructions to the subjects was to prepare them explicitly for an emotional encounter, so it is not surprising to note that the respiratory rates were higher.

Instructions were also given to relax, and it may be that these instructions produced counterproductive results, such that the increase in respiratory rate occurred as the result of the explicit instructions to prepare for an emotional encounter, while the lower HR and ESC occurred as the result of instructions to relax. Or possibly in attempting to relax, more rapid breathing occurred. It is also possible that the initial instructions were so vague as to have produced the mixed physiological reaction observed in the groups. Studies by Lazarus and his colleagues (1966) have already demonstrated that specific instructions will influence autonomic responses.

Implicit sets may product another source of error in the findings. Usually implicit sets have to do with what is not conveyed directly or verbally but which predispose individuals to respond in certain ways. Experimenter bias, demand characteristics, and subjects' own personalities are examples of implicit sets. The only contact with the subject occurred initially when the experimenter connected the physiological apparatus to the subject, gave him a standard set of instructions, answered questions briefly, and reassured him that no shock would be administered and electrical current would be negligible. The remainder of instructions were provided in written form or on the video tape.

It is possible that the presence of physiological equipment with its electrodes and wires generated fantasies and anxieties and produced higher than normal physiological reactivity. This is quite likely since none of the subjects reported any prior exposure to psychophysiological experimentation. With these qualifications it was assumed that demand characteristics were controlled as effectively as possible. It must be recognized that subjects probably realized that no adverse consequences could follow from this experiment and they could become as little or as much involved as they wished. One area which is difficult to control for is the subject's own predispositions which he carried with him to the experiment. No attempts were made to control for such factors as social, cultural, or economic backgrounds in the subjects. At least one study showed that the hypothesis that Irish, Jewish, Italian physiological differences occur (Sternbach and Tursky, 1965).

Personality Types

Do feelers exhibit physiological and psychological patterns that are different from thinkers? Are there patterns that distinguish high empathizers from low empathizers? Are these patterns related to the selection tests? While the data are nonsignificant, it appears that feelers as a class may be physiologically more responsive in

skin conductance than thinkers. The relationship between high and low empathizers is not clear, although it is possible that the selection tests may have had some bearing on these results.

The use of the MBTI to detect T - F personalities may not be a sensitive enough indicator to justify the dichotomy made in this study. In any case, this dichotomy could be other than that purported by the authors of the scale. Items in this scale are easily faked and may represent socially desirable responses rather than accurate statements of behavior types so that the dichotomy could be an artificial one. However, since scores on the A. S. S. require accurate perception of client' s feelings and thoughts and because there is one best answer for each item, it cannot easily be faked or distorted. It may be speculated that more thinkers than feelers existed in the study than was accurately determined by the scores on the MBTI if one accepts the cultural viewpoint that males tend to be less expressive and more logical in their behavior. As this study did not use females, no cross comparisons were possible.

In preparing the data for analysis, only average figures were calculated per period. This method of data reduction is likely to have obscured moment by moment differences which could have occurred to specific words or nonverbal gestures by the actors.

Law of Initial Values

An interesting phenomenon, called the Law of Initial Values, has been reported by Wilder (1957). He observed that the higher the prestimulus level of functioning, the smaller the response to a function increasing stimulus. In extreme cases there may be no response, or a reversal phenomenon. The implication of the Law of Initial Values is that each individual has a built-in limit to rate or amount of physiological functioning. Could this phenomenon explain the lack of difference between the groups? The slope estimates provide some support for the Law of Initial Values. The rest conditions had generally higher but nonsignificant slopes than the vignette conditions. Related concepts of constant stress levels and variable stress levels are reported by Sternbach (1966) which further complicate attempts to explain the lack of significance in this study.

Limitations of Physiological Variables

One of the major problems associated with the interpretation of these results is the amount of data which can be attributed to artifact. Artifact can occur from bodily movements, coughing, sighing, sneezing, talking, temperature changes, pressure changes on electrodes, and the presence of other disturbing electronic

devices. The major source of artifact in this experiment was bodily movements, as the subjects were not strapped down to prevent movement of appendages. Some control was achieved by instructing the subjects to remain physically quiet and the non-preferred hand was used for the skin conductance connections. Room temperature was kept reasonably constant, never varying more than $\pm 2^{\circ}$ F. When artifact was detected on the polygraph records, it was not included in the measurements. A representative section of that period which was free of artifacts was measured. When artifact was detected in the heart rate because of poor skin to electrode contact, a moving average procedure was used. Voltage readjustment of ESC sensitivity was made when artifact was observed in sweat rate. With respiratory rate, measurements of apneas or periods of cessation of the breathing cycle were calculated. Apneas occurred in very few subjects and for short periods of time, so that it can be concluded that the reliability of respiratory rate was not seriously jeopardized. This is especially important when one considers that artifact adds large variance and hence makes statistical significance hard to obtain.

Limitations of Simulated Emotions

Over time the stimulus condition may have had an adaptive effect in the physiological patterns of all four groups. Again, the

significant trial effect alluded to in previous sections as well as the means in Table 5.1 provide some support for this assertion. Because of similarities in the slopes of the groups, it is interesting to note that different emotions or different levels of the same emotion or sex of the actor did not seem to affect the groups differently. Any variation that occurred was confounded in type and level of emotion, sex of actor, and length of vignette. A possible explanation for this phenomenon is that the vignettes triggered off different levels of the same emotion in the subjects.

Another possible explanation about the similarity of these reactions is related to the nature of audio-visual media. Regardless of the content of the vignettes, the audio-visual complex is a stimulus that must be attended to. As a result, attending behavior may have common configuration patterns which are distinctive from those responses accompanying real life emotions. Or a confounding effect may have occurred among genuine responses of threat, fear, rejection, anger with attending behaviors which obscure any meaningful distinctions. Lacey's results confirm the notion that attending behaviors manifest distinctive physiological patterns, while other experiments have not been able to detect significant patterns in emotional responses (Sternbach, 1966).

The findings of Ax (1953) previously cited (Chapter II) regarding physiological differences in anger and fear responses may suggest a more exciting interpretation. The rank order estimates, although nonsignificant, from Table 4.6 in Chapter IV suggest that F's, T's, LE's, and HE's on HR, and on f responded in a fashion parallel to Ax's results. That is, high empathizers regardless of whether they are T's or F's showed physiological responses on HR and on f closer to anger; while LE's showed physiological responses on HR and on f closer to fear. However, the pattern for HE's and LE's on $\overline{\text{ESC}}$ was not consistent with Ax's results and cannot be easily explained (i.e., HE's were ranked first, LE's last).

If the data had been more significant, then it might be that LE's are generally more fearful of the vignettes while HE's may be generally more angry with the vignettes. To consider this highly speculative possibility, the so-called fear response could be related to the definition of a LE as a person low in perceptual empathy or in ability to discriminate accurately the feelings of others. As a consequence, LE's may be appraising the actor's emotional portrayal as a personal threat because they cannot distinguish accurately between rejection-anger and affection-seduction. By contrast, HE's may be accurately discriminating these portrayals

as subtle to direct manipulations and becoming angrier as the trials progress. Additional support for this hypothesis is found in a study done by Greenberg et al. (1970). High and low novice counselor trainees were selected from their scores on a shortened version of the Affective Sensitivity Scale. Along with professional counselors, the novices responsed to the A. S. S. again by filling out a set of 26 bi-polar adjective scales administered after each scene. One of the major findings of the study was that low novices gave much greater emphasis to the "anger" or "hostility" behaviors of the clients than high novices or professional counselors. The authors speculated that low novice counselor trainees "perceive more hostility in clients than do sensitive counselors "or that "they have learned less about the other principal dimensions of client feelings."

It should be remembered that none of the above rank order differences were significant and that the lack of significance on Self-Exploration between HE's and LE's does not offer statistical support for this speculation.

Practical Implications

Practical implications for the combined use of affect simulation and physiological monitoring are limited due to the lack

of statistical support for the research hypotheses. Moreover, the expense of purchasing this equipment, the time spent in connecting various electrodes to a subject, and the technical skills needed in calibrating, maintaining, and repairing the equipment would not justify its use for training programs or psychotherapy at the present time. It is definitely not a procedure to be used for selection purposes such as T's vs. F's or HE's vs. LE's in counselor programs, although combined with the use of other procedures such as Interpersonal Process Recall, it might be useful in counselor training programs to allow trainees to actually see that their own body does appear to respond to emotions.

Basic Research Implications

The principal value of these findings lies in basic research. Implications in the areas of general activation versus stimulus-response specificity, and differentiation of emotions will be discussed.

General Activation Versus Stimulus-Response Specificity

There is no statistical evidence to argue for stimulus-response specificity. Refinements in design and procedures may contribute to future significant results:

1. The study should be replicated. Increasing the sample size as well as using female subjects would provide a tighter design and greater generalizability of results.
2. The removal of artifact might permit more accurate distinctions between general activation and stimulus-response specificity. The addition of measures such as oxygen consumption and alpha wave functioning might provide additional data on coping styles and the detection of artifact due to bodily movements.
3. Adaptation was mentioned as a possible explanation of the observed phenomenon in the study. One possibility in the future is the use of fewer vignettes. Instead of eight vignettes, four vignettes could be presented or a longer rest period between vignettes allowed. Another possibility is to select more extreme subjects.

Differentiation of Emotions

It was difficult to detect and isolate specific emotional reactions to the vignettes because emotions were confounded with types and levels of emotions, order of vignettes, and sex of the actors. Several design improvements are possible:

1. Vignettes using the male actor only could be presented to both male and female subjects. With the same subjects, vignettes portrayed by the female actress only could subsequently be presented.
2. A different random ordering of the vignettes for each subject and/or levels of emotion could be used with 1 above as an additional refinement.
3. Would subjects respond physiologically to real life emotions in the same manner as simulated encounters and bland encounters? This question suggests a method for the comparison of physiological responses to real and simulated emotional encounters, and furthermore as a comparison to a nonemotional encounter. Valuable information on general activation and stimulus-response specificity might also be obtained with this design.
4. The results of the Self-Exploration Scale revealed different levels of awareness between F's and T's (content analysis might provide useful information on emotions described, the levels of specific emotions, and relationships to personality types).
5. Research has already been cited of possible effects of implicit and explicit communication to subjects. What

would be the effects of an explicit set of instructions to become emotionally involved versus an explicit set of instructions to refrain from emotional involvement versus no instructions; all of these conditions with known personality groups?

6. It is possible that additional pre- and posttest assessments might differentiate known groups more accurately. Less fakable instruments such as the Taylor Manifest Anxiety Scale or Rotter's Internal-External Scale are possibilities. There is a definite need for an instrument to measure moment to moment psychological change which can be correlated with simultaneous physiological activity. The Multiple Affect Adjective checklist has received extensive use and could be a useful tool in this kind of research.
7. As noted previously, cultural groups vary in their physiological activity under electric shock. Some evidence exists that Japanese and Americans show different physiological activity when exposed to stress films (Lazarus, 1966). With the present emphasis on counseling minority groups, pilot studies with chicanos and blacks could determine if physiological differences exist between whites and these groups.

8. Statistical procedures used for the quantification of physiological data need improvement. Obtaining average responses or comparing the magnitude of responses within and between persons does not account for the influence of the prestimulus level on response magnitude due to the Law of Initial Values (LIV) which was discussed earlier as one possible reason for the lack of statistical significance. The analysis of covariance is one procedure that can analyze responses to stimulation for significant differences while taking the correlation between prestimulus and response levels into account.

   Continuous measurement of physiological activity is another statistical procedure that would be preferred over an interval measurement. Thus comparisons with specific statements made by the actor could be made rather than an average reaction to an entire vignette.

9. Research was presented in Chapter III on the effects of familiar and unfamiliar persons upon physiological reactivity. A possible design in which acquaintances of subjects portrayed rejection and affection versus strangers portraying the same emotions would be interesting.

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APPENDICES

APPENDIX A

AFFECTIVE SENSITIVITY SCALE

Instructions

You will be viewing short scenes of actual counseling sessions. You are to identify what feelings the clients have toward themselves and toward the counselors they are working with.

Although in any one scene a client may exhibit a variety of feelings, for the purpose of this instrument you are to concentrate on identifying his last feelings in the scene.

On the following pages are multiple choice items consisting of three responses each. Most scenes have two items, but a few have one or three items. After you view each scene, you are to read the items and ask yourself the following question:

> If the client were to view this same scene, and if he were completely open and honest with himself (i. e., if he could identify his real feelings), which of these three responses would he use to describe his feelings?

After you decide which response accurately describes what the client is actually feeling either about himself or the counselor he is with, indicate your choice on the answer sheet.

Here is a sample item:

CLIENT I
Scene 1

Item 1

1. This exploring of my feelings is good. It makes me feel good.
2. I feel very sad and unhappy.
3. I'm groping and confused; I can't bring it all together.

After you had viewed Scene 1 for CLIENT I, you would read these three statements (Item 1) and would then decide which one best states what the client would say about his own feelings after viewing the same scene. For example, if you decide number two best states what the client is feeling, you would then find the number 1 on your answer sheet and darken the space for number two.

1. 1 ---- 2 ■■■■ 3 ---- 4 ---- 5 ----

We will only make use of the first three answer spaces following each item on your answer sheet.

Remember you are to concentrate on the latter part of each scene in determining the most accurate description of the client's feelings.

After you view the appropriate scenes, you will have thirty seconds to answer each of the first twelve items. For each of the remaining items, you will be allowed twenty seconds.

APPENDIX B

MYERS-BRIGGS TYPE INDICATOR

THINKER-FEELER ITEMS

1. Are you more careful about
   A) people's feelings (F)
   B) their rights (T)

2. Are you inclined
   A) to value sentiment above logic (F)
   B) to value logic above sentiment (T)

3. Which of these two is the higher compliment
   A) he is a person of real feeling (F)
   B) he is consistently reasonable (T)

4. Do you think it is a worse fault
   A) to show too much warmth (T)
   B) not to have warmth enough (F)

5. Would you rather work under someone who is
   A) always kind (F)
   B) always fair (T)

6. Do you more often let
   A) your heart rule your head (F)
   B) your head rule your heart (T)

7. Do you think it is a worse fault to be
   A) unsympathetic (F)
   B) unreasonable (T)

Which word in each pair appeals to you more?

8. A) firm-minded (T)
   B) warm-hearted (F)

9. A) analyze (T)
   B) sympathize (F)

10. A) benefits (T)
    B) blessings (F)

11. A) uncritical (F)
    B) critical (T)

12. A) convincing (T)
    B) touching (F)

13. A) soft (F)
    B) hard (T)

14. A) forgive (F)
    B) tolerate (T)

15. A) who (F)
    B) what (T)

16. A) determined (T)
    B) devoted (F)

17. A) compassion (F)
    B) foresight (T)

18. A) justice (T)
    B) mercy (F)

19. A) wary (T)
    B) trustful (F)

20. A) gentle (T)
    B) firm (F)

21. A) thinking (T)
    B) feeling (F)

22. A) peacemaker (F)
    B) judge (T)

23. A) agree (F)
    B) discuss (T)

APPENDIX C

HELPEE SELF-EXPLORATION IN INTERPERSONAL PROCESSES, II

A Scale for Measurement[1]

Level 1

The second person does not discuss personally relevant material, either because he has had no opportunity to do such or because he is actively evading the discussion even when it is introduced by the client.

Example: The second person avoids any self-descriptions or direct expression of feelings that would lead him to reveal himself to the client.

In summary, for a variety of possible reasons, the second person does not give any evidence of self-exploration.

Level 2

The second person responds with discussion to the introduction of personally relevant material by the first person but does so in a mechanical manner and without the demonstration of emotional feeling.

Example: The second person simply discusses the material without exploring the significance or meaning of the material or attempting further exploration of the feeling in our effort to uncover related feelings or material.

In summary, the second person responds mechanically and remotely to the introduction of personally relevant material by the first person.

Level 3

The second person voluntarily introduces discussions of personally relevant material but does so in a mechanical manner and without the demonstration of emotional feeling.

Example: The emotional remoteness and mechanical manner of the discussion give the discussion a quality of being rehearsed.

In summary, the second person introduces personally relevant material but does so without spontaneity or emotional proximity and without an inward probing to newly discovered feelings and experiences.

Level 4

The second person voluntarily introduces discussions of personally relevant material with both spontaneity and emotional proximity.

Example: The voice quality and other characteristics of the second person are very much "with" the feelings and other person materials which are being verbalized.

In summary, the second person introduces personally relevant discussions with spontaneity and emotional proximity but without a distinct tendency toward inward probing to newly discovered feelings and experiences.

Level 5

The second person actively and spontaneously engages in an inward probing to newly discover feelings and experiences about himself and his world.

Example: The second person is searching to discover new feelings concerning himself and his world even though at the moment he may be doing so, perhaps, fearfully and tentatively.

In summary, the second person is fully and actively focusing upon himself and exploring himself and his world.

---

[1]The present scale "Self-exploration in interpersonal processes" has been derived in part from "The measurement of depth of intrapersonal exploration" (Truax, 1963) which has been validated in extensive process and outcome research on counseling and psychotherapy (Carkhuff and Truax, 1965, 1965a, 1965b; Rogers, 1962; Truax, 1963; Truax and Carkhuff, 1963, 1964, 1965). In addition, similar measures of similar constructs have received extensive support in the literature of counseling and therapy (Blau, 1953; Braaten, 1958; Peres, 1947; Seeman, 1949; Steele, 1948; Wolfson, 1949).

The present scale represents a systematic attempt to reduce the ambiguity and increase the reliability of the scale. In the process many important delineations and additions have been made. For comparative purposes, Level 1 of the present scale is approximately equal to Stage 1 of the earlier scale. The remaining levels are approximately correspondent: Level 2 and Stages 2 and 3; Level 3 and Stages 4 and 5; Level 4 and Stage 6; Level 5 and Stages 7, 8, and 9.

APPENDIX D

DISTRIBUTION OF SCORES ON MBTI AND A. S. S.

Subject	MBTI			A. S. S.	
	Preference Score	Continuous Score	Percentile	Raw Score	Level of Empathy
			Feelers		
1	45	145	98	28	LE
2	31	131	84	29	LE
3	27	127	77	28	LE
4	25	125	73	40	HE
5	21	121	65	28	LE
6	21	121	65	30	LE
7	19	119	61	27	LE
8	17	117	56	33	HE
9	17	117	56	28	LE
10	15	115	52	34	HE
11	13	113	46	33	HE
12	13	113	46	31	HE
13	11	111	40	34	HE
14	11	111	40	30	LE
15	21	121	65	34	HE
16	11	111	40	33	HE
17	09	109	34	41	HE
18	11	111	40	29	HE
19	03	103	12	22	LE
20	19	119	61	40	HE

Subject	MBTI			A. S. S.	
	Preference Score	Continuous Score	Percentile	Raw Score	Level of Empathy
			Thinkers		
21	45	55	98	32	HE
22	41	59	96	33	HE
23	35	65	88	23	LE
24	33	67	85	36	HE
25	25	75	71	31	HE
26	23	77	66	14	LE
27	23	77	66	30	LE
28	23	77	66	26	LE
29	21	79	61	24	LE
30	19	81	56	26	LE
31	17	83	50	30	LE
32	17	83	50	25	LE
33	13	87	39	31	HE
34	07	93	22	40	HE
35	05	95	16	32	HE
36	05	95	16	30	LE
37	03	97	10	46	HE
38	03	97	10	30	LE
39	03	97	10	34	HE
40	01	99	03	39	HE

APPENDIX E

STIMULUS VIGNETTES

IN ORDER OF PRESENTATION

a) Male 1 min. 17 sec. Seduction: moderate level

Non-verbal behavior: Actor leaning forward in chair, speaks in a low, intimate voice. Appears very satisfied.

Actor: You are so neat (laughter). That's the way I feel. You know in a day and age like this there just aren't many people like you... and I am glad I found one of them. I'd like to... you know, just forget about everybody else and just stay with you.

---

b) Male 1 min. 58 sec. Seduction: highest level

Non-verbal behavior: Actor has very intimate manner, rubs hands together in stroking, sensuous manner.

Actor: Have you got any idea of the way that you just get to me? You know, I can't be near you for five minutes; and I go out of my mind. I just want to touch you all the time; I just want to be near you, to feel you sitting near me, next to me, to smell you sitting next to me. On the street, just everywhere, and that's the way you hit me... the way you get to me. Nobody else does it like that, not that way, not that strongly. It's like animals, you know? Now, doesn't that really make you feel the same way? At least you act like it does. Whether you feel it or not, I don't know; but if I can take your feelings from your actions, I know the way you seem.

---

c) Female 1 min. 42 sec. Seduction: moderate level

You make me nervous. I don't know what to say to you. Course, I think you're very nice. Perhaps if we just sat here awhile and talk about something else. (sighs). I don't know how to tell you. Why don't you say something. (sighs).

---

d) Female 1 min. 45 sec. Seduction: high level

I've liked you for such a long time. I just love to be with you. (nervous--many hand motions). I don't know how to tell you. I don't usually go around and tell people things like this, but every time I'm with you, I just get so hot. I really do, and if you don't come over here pretty soon and kiss me, I am going to go out of my mind.

---

e) Male 1 min. 53 sec. Mild rejection

Non-verbal behavior: Actor still aloof, more condescending, pompous. He appears to be lecturing or "talking down" to the viewer.

Actor: I really don't think that's true. I mean...I think that probably you are very wrong in that. I suppose that you can go right on believing that way if you want to, but you can't really expect for me to go along with you. You know what you think and certainly no one is going to tell you not to think what you honestly believe, but I think you should reexamine some of the things that you believe, because most of us couldn't bring ourselves to feel that way. How about it, humm? Well, you think about it...You think about it.

---

f) Male 41 sec. Strongest rejection

Non-verbal behavior: Actor expresses much anger in facial expressions; threatens, shakes fist at viewer, pushes chair away from table as if preparing to climb over it at viewer, pounds table with fists.

Actor: Well, you son of a bitch! Somebody ought to just kick your face right in! Honest to God, I'd just like to...Will you get the hell away from me before I come over there and just clobber the shit out of you. Now get away! Go on! (grinds cigarette emphatically into ashtray).

---

g) Female 52 sec. Mild rejection

Oh yes, we do need people (condescending). We're rather short handed now and well, ah, if you'd like to come we'd be delighted to have you. Um, I'm sure there's something we can find for you. Ah, if you'd like to stick with it. Of course, if you're too busy, we could get along but we do need people to come. Umm. Oh yes, why don't you come and try us and we'll see what we can work out.

---

h) Female 2 min. 39 sec. Strong rejection

I guess I don't think we'd better go on like this. I don't appreciate your feeling this way toward me, so if we could go on being friends. I wish you'd quit that. You're not at all (coughs) what I thought about, and if you keep on like this I'm going to have to ask you to leave. This is a very uncomfortable situation for me, and I hope that it becomes as uncomfortable for you as it is for me that you'll quit it. I'm sorry I don't feel this way about you, I really am, but we don't have any control over our feelings. I'm very sorry you started this and I'll have to insist that you quit it. It's no longer a lovely evening and I want you to leave, so please go, cause if you don't, I'm going to (sighs). Stop it (sighs).

APPENDIX F

LETTER OF INTRODUCTION TO SUBJECTS

August, 1971

Dear

Thank you for agreeing to participate in my experiment. It deals with physiological reactions to simulated emotions. You will be given specific feedback regarding the exact nature of the experiment by mail--as much as you need to fully understand what I am attempting to find out. And I will be glad to show you your records and meet with you individually to discuss anything else you may wish to know about this experiment. May I ask you not to discuss this experiment with other potential subjects whom you may know until after they have completed the experiment also.

In preparation for our procedures, I would like you to follow the hints below as closely as possible:

1. Try to sleep well the night before.
2. Abstain from alcohol and drugs for at least 24 hours.
3. Refrain from meals and beverages two hours before the experiment.
4. Refrain from drinking water and smoking for one-half hour before the experiment.
5. If you have any cardio-vascular (heart) disorders, however mild, let me know before the experiment.

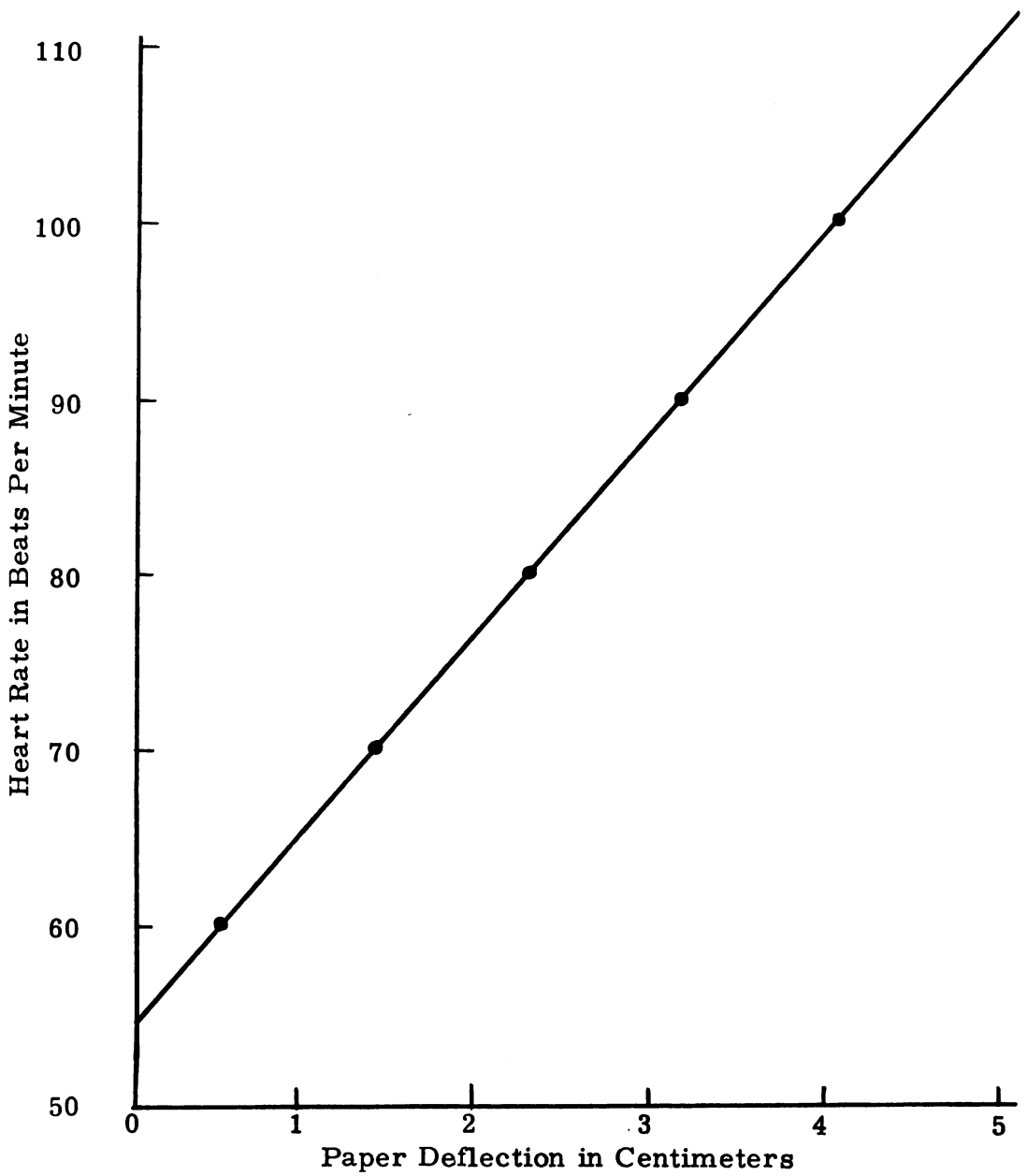
See you at _____ promptly on _____, _____.

Cordially yours,

Bill Martin
Doctoral Student
Counseling Psychology

APPENDIX G

RELATIONSHIP BETWEEN HEART RATE AND CHART RECORDING



APPENDIX H

SPECIFIC INSTRUCTIONS FOR SECOND VIEWING

You will be watching the scenes again. This time as you watch each scene try to recall your original thoughts and feelings about the person on the screen. Specific questions to keep in mind as you watch these scenes for the second time are:

1. How did he or she impress you?

2. What were your immediate reactions?

3. How did he or she make you feel?

4. What would you have liked to say to him or her?

5. Did your feelings or thoughts change toward him or her before the end of the scene? If so, how?

6. Did he or she remind you of anyone or anything in particular?

At the end of each scene, please give a verbal summary into microphone of your reactions to the person you just saw. You may use the above questions as a guideline. Feel free to include any other reactions not suggested by the questions above. After you have finished your summary, please press the call button on the intercom next to you. The next scene will then be shown.

APPENDIX I

VALUES OF F FOR PHYSIOLOGICAL VARIABLES NOT USED IN ANALYSIS

	Style	Empathy	Style × Empathy
High Point Heart Rate			
R	.55	3.40	.14
O	1.74	2.08	.30
S	1.58	2.05	.00
High Point Electrical Skin Conductance			
R	.48	1.14	.16
O	.46	.83	.21
S	.55	1.34	.13
Low Point Heart Rate			
R	.56	1.77	.68
O	.95	2.29	.25
S	.72	1.90	.53
Low Point Electrical Skin Conductance			
R	.59	1.64	.14
O	.48	.92	.23
S	.70	1.51	.18
Peaks for Heart Rate			
R	.10	.26	.02
O	6.21	.02	.84
S	.96	.54	.24
Peaks for Electrical Skin Conductance			
R	1.15	.03	.45
O	1.44	.40	.39
S	1.58	.01	.23