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PSYCHOPHYSIOLOGICAL CORRELATES

OF MEASURES OF EMPATHY

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PSYCHOPHYSIOLOGICAL CORRELATES
OF MEASURES OF EMPATHY

By

Michael Gary Lieberman

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ABSTRACT

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OF MEASURES OF EMPATHY

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Psychologists have paid considerable attention to the "helping relationship". One aspect of this relationship is the concept of empathy. One conceptualization of empathy which was used in the study is Barrett-Lennard's concept. Barrett-Lennard viewed empathy as a tri-pasic process.

Psychophysiologists have studied the correlates of an organism's accepting and/or rejecting environmental stimuli. This study was an attempt to investigate the relationship between three measures of empathy and the hypothesized psychophysiological correlates of an individual's involvement/non-involvement with environmental stimuli.

Three physiological systems were analyzed. They were: 1) cardiovascular, 2) electrodermal, and 3) respiratory. The research literature suggested when an individual attended to environmental events that cardiac activity would decelerate; conversely, when attention was focused in-ward cardiac activity would accelerate. One hypothesis of

this study, therefore, was that when a subject was involved with filmed stimulus vignettes heart rate would become less labile.

Research literature suggested that when an individual was involved in environmental tasks electrodermal activity would increase--become more labile. A second hypothesis, therefore, was that when an individual was involved with a filmed stimulus vignette skin conductance would be labile.

An additional hypothesis concerned bilateral skin conductance assymetry. Recent psychophysiological research has demonstrated bilateral assymetric differences of autonomic processes. This study hypothesized that there would be significant differences in bilateral skin conductance activity measured simultaneously from on the palmar surface of both hands.

Sixty students in the first year class in the College of Human Medicine volunteered for an alternative laboratory experience. Students were shown two series of affect stimulus vignettes in which an actor or actress looks directly into the camera and makes an affect laden statement; simultaneously, their physiological responses were recorded. In addition, the students conducted weekly interviews with patient models. During the seventh week of their Doctor-Patient Relationship class, students conducted an interview with a patient-model who presented a sexual dysfunction problem. These interviews were rated by trained raters on

The Carkhuff Empathic Understanding Scale which measured the student's ability to make empathic responses. This scale is a 5-point Lickert scale. Each patient rated the student on the Barrett-Lennard Relationship Inventory which measured the student's ability to be perceived as empathic. All students took the Affective Sensitivity Scale, a filmed test which measured the student's ability to identify the emotion of the person in the recorded scene.

Two canonical analyses were carried out on this data. The first canonical analysis correlated the three empathy measures with heart rate peak score. Results indicated that heart rate was positively correlated with the empathy measures. This correlation was significant, but in a direction opposite to that hypothesized. The second canonical analysis correlated two of the three empathy measures with respiration amplitude, respiration frequency, right hand skin conductance magnitude, and left hand skin conductance slope. A significant correlation was found in the hypothesized positive direction.

Four matched-pair t-tests were carried out on the four bilateral skin conductance measures. Results indicated that there were significant differences on all four measures.

The results of this study were discussed, along with implications for future research. Results gave no indication of cardiac quiesence during environmental involvement, in fact, the converse was found. The electrodermal and respiratory results confirmed the research hypothesis. There was a significant positive relationship between the empathy measures and respiratory and electrodermal activity. Finally, this study found significantly greater electrodermal activity on the right hand compared to the left hand.

DEDICATION

This volume is dedicated to the memory of my parents, Frank and Thelma, who made me human an instilled in me a set of values which made the last four years possible.

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CHAPTER I

THE PROBLEM

Introduction

In its broadest sense this is a study of the relationship of "body" and "mind". By themselves in conventional usage, the words "mind" and "body" are easy to understand. Webster's dictionary defines body as "the whole physical substance of a man, animal, or plant". The word "mind" has a more equivocal meaning. Webster's dictionary defines mind as "memory or rememberance; what one thinks; what one intends or wills; and that which thinks, perceives, feels, etc." However, the concept "mind/body integration" is both complex and perplexing.

Throughout the ages, noted philosophers and scientists have debated the relative merits of either the separateness or relatedness of the mind and body. The ancient Greeks debated the difference between "nous" the mind and "psyche'" the soul and their relation to the body. Aristotle, in On the Soul, wrote, "Probably all the affections of the soul are associated with the body-anger, gentleness, fear, pity, courage, and joy, as well as loving and hating; for when they appear the body is also affected" (Hett translation, 1936). Plato, who was a dualist, saw the soul as a separate enity from the body. What is both interesting and contradictory in Plato's writings is that he also wrote "all the different aspects of things dealt with by the several sciences must be correlated if we are to know reality in its fullness" (Blakewell translation, 1928). Socrates was reported to believe that there were some illuminating similarities between good bodily states, such as health and strength, and good soul states, such as virtue and happiness; or at least, that good soul states should be thought of on the model of good bodily states (Santas, 1979). Two thousand years later, Descarte wrote on the concept of dualism. He considered mind and body to be totally separate. Descarte tried to establish that physiological causes do not rob the mind of a power of self-determination. Writing in 1637 on his dualistic philosophy, he remarked, "this ego, that is, the soul by which I am what I am, is entirely distinct from the body, and it is even easier to know that the body, and even if the body did not exist, the soul would not cease to be what it is" (Morris transaltion, 1971). Nietzsche, who has been perceived incorrectly as a dualist, repudiated any strict division of flesh and spirit, insisting that the two could be understood only in their inextricable togetherness (Kaufmann, 1968).

Even as late as the 1800's, an English physician named Tuke (1884) wrote an extensive volume titled Illustrations of the Influence of the Mind upon the Body. In this work he concluded:

> We have seen that the influence of the mind on the body is no transient power; that in health it may exalt sensory functions, or suspend them altogether; excite the nervous system so as to cause the various forms of conclusive actions of the voluntary muscles....

Finally, Planck (1931) spoke of the need for a wholistic approach to the study of all systems saying, "...it is impossible to obtain an adequate version of the laws for which we are looking unless the physical system is regarded as a whole" (Restak, 1971).

During the last hundred years, the predominant approach of the scientific community has been to study the mind and body in isolation relative to each other. Study of the behavior of the body has been classically the domain of the biological sciences. Rapid advancements in observational techniques have led to rapid growth in the discovery of bodily phenomena. As these discoveries occurred, the theories and laws of the biological sciences were questioned and revised. Many of these discoveries led to an increase in the blurring of the boundaries between the disciplines. What is interesting is that for many years this led to subdivisions or subspecialties within the separate disciplines rather than an increased interrelationship between the disciplines. The development of subspecialties has led to an even more rapid expansion of the reservoir of knowledge concerning the behavior of the human body. This trend toward subspecialization has unquestionably led to a significant improvement in the quality of the human condition. Only recently, however, have scientists realized that the more they discover within their respective fields the more they must rely on discoveries from the other disciplines to try to explain adequately the phenomena they observe.

A developmental process of a similar nature occurred in the study of the mind, however, in the social sciences there was a degree of sharing of information. As in the development of the study of the body, observational and measurement techniques improved and our reservoir of knowledge grew. Theories and laws were questioned and revised to fit the new body of information. Subspecialties developed within the separate disciplines of the social sciences. Unlike the biological sciences, however, there was a somewhat earlier sharing of ideas and information between the disciplines.

An example of the "separate" approach to the study of the body and mind is to be found in the study of the brain and the mind. The study of the brain and its biological functions are the domains of the neuroanatomist and the neurologist; whereas the mind is the domain of the psychologist. Within the last fifteen years, the development of the field of psychobiology, with its emphasis on how the brain influences our perceptions of the world, how we know ourselves and the nature of reality, is an illustration of the re-emergence of interdisciplinary cooperation between the biological and social sciences. Psychophysiology is an example of another cooperative effort between the sciences. In general, these interdisciplinary efforts occur at points of logical compatibility between the disciplines. Psycholophysiology developed from human physiology and experimental psychology. This led eventually to other subspecialties exploring the relationships between their domains and disciplines which seem incompatible.

This study is one which falls into this last type of relationship where seemingly incompatible subspecialties explore the relationships between their domains. This study combines the disciplines of counseling psychology, psychophysiology, and physiology. The nature and scope of such an undertaking poses some unique problems. Because this study involves more than one discipline, the research encompasses a large body of related literature. In addition, the disciplines often use different language and terminology to describe concepts which are similar. These concepts then must be transformed into a form which makes the different terminologies compatible. This study requires, also, the integration of theoretical constructs, measurement techniques, and application procedures from diverse areas such as physiology, psychophysiology, biomedical engineering, computer science, psychology, and counseling psychology.

Comparison of the volume of literature which exists in these separate fields to the literature concerning the relationships between these fields reveals the latter volume to be sparse.

Need

There is a need to continue to explore the relationship between mind-body relationships. This study attempts to explore two specific aspects of this relationship. The first aspect is the relationship between psychophysiological responsiveness, and the psychological concept of empathy. The second aspect of the mind-body relationship which this study will explore is that of bilateral differences in electrodermal activity.

This study has practical implications. Over the last thirty years, the exploration of the "helping relationship" has been a major area of endeavor for both counseling and clinical psychologists. Theorists and practitioners from the various schools of thought (Rogers, 1957; Barrett-Lennard, 1962; Paul, 1969, Sullivan, 1953; and Fromm-Reichmann, 1950) have postulated numerous characteristics or skills which the effective "helper" must possess. Empathy is one of the more thoroughly researched characteristics (Rogers, 1950, 1957; Barrett-Lennard, 1976; Fish, 1970; Guerney, et. al. 1968; Wogan, 1969; and Carkhuff, 1969).

Rogers (1957, 1961), writing on the necessary characteristics which the counselor/psychotherapist must possess and exhibit to effect change in the therapeutic relationship, presented the earliest global statement on empathy, saying:

> Can I let myself enter fully into the world of his feelings and personal meanings, and see these as he does? Can I step into his private world so completely that I lose all desire to evaluate or judge it? Can I enter it so sensitively that I can move about it freely....Can I extend this understanding without limit? (Rogers, 1957, p. 98)

Underscoring the importance of empathy in the therapeutic process, Rogers cites the research of Fiedler (1950) in which items such as the following placed high in the description of the relationships created by experienced therapists:

> The therapist is well able to understand the patient's feelings. The therapist is never in any doubt about what the patient means. The therapist's remarks fit in just right with the patient's mood and content. The therapist's tone of voice conveys the complete ability to share the patient's feelings (Rogers, 1966, p. 4).

If a relationship between empathy and physiological responsiveness could be established, it might then be possible to improve a therapist's empathic ability by providing him/her with information about his/her physiological concomitants of empathy in various interpersonal situations. A prerequisite to the use of such a technique would be to first establish the psychophysiological correlates of empathy. This study addresses the need to establish these psychophysiological correlates.

Purposes

The purpose of this study was to explore the relationship between psychophysiological responsiveness to affective stimuli, using cardiovascular, electrodermal, and pulmonary responses and the psychological concept of empathy. A second purpose of this study was to clarify the relationship between bilateral electrodermal differences in skin conducatnace and empathy.

Hypotheses

It is expected that there will be a positive correlation between physiological response to affective stimuli, as measured by electrodermal and pulmonary responses and three measures of empathy (Carkhuff Empathic Understanding Scale, Affective Sensitivity Scale, and Barrett-Lennard Relationship Inventory). It is hypothesized that there will be a negative correlation between cardiovascular response to affective stimuli and the three empathy measures. The final hypothesis is that electrodermal response to affective stimuli will be greater on the right hand than on the left hand.

Theory

Why would one expect to find a relationship between empathy and physiological responsiveness? Why would one expect to find this relationship in the particular responses hypothesized? In the preceeding sections, an historical overview of the relationship between body and mind was presented. This section will provide a theoretical basis for the relationship between mind and body. There are two topics in this section which are particularly critical to the building of this theory. One topic concerns the nature of empathy. Empathy involves the ability to be sensitive to another's feelings, to communicate that sensitivity, and to be perceived by the other as sensitive or empathic. One component of empathy, therefore, is the ability to become involved with and attend to the communications of others. The other topic concerns the physiological response patterns. Research will be presented which relates the direction and magnitude of a physiological response (to affective stimuli) to environmental intake and involvement. If one component of empathy is the ability to become intensely involved with another person, and degree and magnitude of a physiological response is evidence of increased environmental involvement; then, there should be a relationship between degree of empathic ability and the direction and magnitude of physiological response.

This study bears directly on four theoretical constructs. The first concerns the Interpersonal Process Recall model. The second concerns the nature of empathy. The third concerns the psychophysiological response patterns of cardiovascular, electrodermal, and pulmonary activity. The fourth and final construct concerns the nature of bilateral differences in electrodermal activity.

This research evolved from a National Institute of Mental Health grant to study further model development of the Interpersonal Process Recall process. The data for this study was collected as part of this further model development. This fact makes the discussion of the Interpersonal Process Recall (I.P.R.) model a logical point to start. The I.P.R. process was conceived at Michigan State University, in 1962, by Kagan and his associates (Kagan, Krothwohl, and Miller, 1963; Kagan, Krothwohl, and Farquhar, 1965; Kagan and Krothwohl, 1967). During the intervening years, the I.P.R. model has been applied in a multitude of different settings. These settings range from its use to accelerate client growth, to its use in urban schools, to the training of residence hall assistants (Tomary, 1979; Kagan and Burke, 1976; Dendy, 1971). One of the most innovative applications of the I.P.R. model is in the area of medical education. The model is used to increase the interpersonal effectiveness of medical students during patient interviews (Jason, Kagan, Werner, Elstein, Thomas, 1971; Elstein, Kagan, Schulman, Jason, and Loupe, 1972; Werner and Schneider, 1974). I.P.R. is used extensively now, throughout the world, to facilitate medical students' interactional skills (Robbins, Kraus, Heinrick, Abrass, Dreyer, and Clyman, 1979; Blair and Fretz, 1980).

Interpersonal Process Recall (I.P.R.) is a method used for influencing human interaction (Kagan, 1975, 1979). The goal of the process is to increase awareness of one's own experience as well as one's awareness of the experience of others during a given interaction. A video or audio tape is made of an interaction between two or more individuals. The tape is then played back to one or more of the individuals who participated in the interaction. With the help of an "inquirer" the individual(s) "processes" the reactions they experienced during the interaction. The inquirer is trained in the I.P.R. model and facilitates the "recall" (discussion) of the participant(s) reactions to the interaction. The audio or videotape of the initial interaction is used as a stimulus for recall. The participant(s) is encouraged to recall the thoughts, feelings, images, and fantasies experienced during the recall. They then discuss these with the inquirer. The inquirer's main function is to ask open-ended questions regarding the reactions which the participant(s) discloses.

Kagan and his colleagues, in an extension of his work, developed filmed "stimulus vignettes" (Kagan and Schauble, 1969; Kagan and Van Noord, 1976). In these vignettes, actors or actresses look directly into the camera and make some type of emotionally-laden statement (e.g. It's you, and people like you who cause most of the misery and suffering in the world...). The purpose of the vignettes is to simulate potentially evocative interpersonal situations. Vignettes have been developed to evoke such affective states as anger, fear, helplessness, sexual arousal etc.....Kagan refers to the use of these vignettes as "a type of interpersonal allergy test". Students are videotaped while watching these vignettes, and the tapes are then used in the recall process.

A physiological feedback component was added to the stimulated recall process, as a result of updating and experimenting with different procedures to increase the effectiveness of the recall process (Archer, Fiester, Kagan, Rate, Spierling, and Van Noord, 1972). Measures of various physiological activity were recorded, videotaped, and then played back to the subject. The goal was to provide the individual with an additional basis for exploring his/her interpersonal behavior. Archer et.al. saw the potential to use this physiological response data in the facilitation of the counseling process; "it seemed logical and desirable to provide...not only an opportunity to study his physical and verbal reactions to a real or simulated interpersonal engagement but to permit him to see what his internal responses were as well". A similar potential is seen for the use of this technique in the facilitation of the development of empathic skills. The first step toward achieving that goal is establishing that a relationship does exist between empathic ability and physiological response to affective stimuli.

The physiological data for this study was collected in the laboratory which was developed for the physiological feedback component of the I.P.R. process. The data was collected during an ongoing I.P.R. medical education training project. It is important to note that this setting offered the opportunity to collect data in a setting quite unlike the settings in which most psychophysiological research is conducted. In most research of this type, the subject is in a sterile environment, the purpose of which is to control any irrelevant stimuli. The subject is then presented some type of psychophysical stimuli such as ringing bells, flashing lights, cold pressor tests, shocks, etc. These stimuli are considered, by the particular researchers, as affective stimuli. The subjects physiological response to these stimuli are recorded and evaluated. In this study, because of the physiological feedback laboratory, participants were presented a form of affective stimuli, filmed vignettes, of a person "looking at" the subject and apparently talking to the subject. This situation approximates more closely the complex interpersonal situations of real life. Since this form of presentation approximates more closely the real world, the individual's physiological response to these vignettes should reflect more closely their true physiological response to affective situations. Chapter III contains a detailed discussion of this laboratory procedure.

The second topic of concern in this study is empathy. Empathy is one of the most researched concepts in phenomonological psychology. A review of the Journal of Counseling Psychology alone, reveals that there is at least 3-6 articles in each of the last ten years exploring some aspect of empathy. These articles range from research on techniques for improving empathic ability

(Fridman and Stone, 1978; Shaffer and Hummel, 1979; Caracena and Vicory, 1969), to the effects of empathic ability on client progress (Grater and Claxton, 1976), to test instruments to measure empathy (Hill and King, 1976), to position papers on the theoretical conceptualization of empathy (Barrett-Lennard, 1981).

The word empathy is directly traceable to the Greek word _Empatheia_. _Empatheia_ means affection with suffering. The prefix _em_ means "in" or "into". Barrett-Lennard (1981) traces the modern usage of empathy to the German psychologist Theodor Lipps. "Lipps used the term _Einfuhlung_ to refer to the process of becoming totally absorbed in an external object...". Barrett-Lennard also traces the concept, if not the use of the word itself, to Alfred Adler. "...Adler had written with simple eloquence of the vital importance in his system of the helper possessing 'to a considerable degree, the gift of putting himself in the other person's place'".

The term empathy is associated closely with Carl Rogers (1950, 1957). Rogers speaks of empathy as "an individual's experiencing an understanding of another's internal frame of reference and endeavoring to communicate this experience to the other individual. To sense another's private world as if it were your own, but without ever losing the 'as if' quality, this is empathy, and this seems essential to the helping relationship". Dymond (1949) defined empathy as the imaginative transposing of oneself into the thinking, feeling, and acting of another. Truax and Carkhuff (1967) defined empathy as a process of experiencing what another is experiencing. Goldstein (1973), who is a staunch behaviorist, underscored the importance of empathy in the therapeutic process, stating, "..if any therapeutic intervention is to be effective... the therapist must establish that (1) he understands and accepts the patient, and (2) that the two of them are working together."

Barrett-Lennard (1962, 1963, 1976, 1981) provides one of the most in-depth recent theoretical conceptualizations of the process of empathy. Barrett-Lennard views the empathic cycle as a five step process. He states these five steps as follows:

> Step 1. 'A' is actively attending (with an empathic set) to 'B', who is in some way expressive of his/her own experiencing (and concomitantly expecting, hoping, or trusting that 'A' is receptive).
>
> Step 2. 'A' reads or resonates to 'B' in such a way that directly or indirectly expresses aspects of 'B's' experience become experientally alive, vivid, and known to 'A'.
>
> Step 3. 'A' expresses or shows in some communicative way a quality of felt awareness of 'B's' experiencing.
>
> Step 4. 'B' is attending to 'A's' response sufficiently at least to form a sense or perception of the extent of 'A's' immediate personal understanding.
>
> Step 5. 'B' then continues or resumes visible self expression in a way that also carries feedback elements for 'A'... (pgs. 93-94).

He further goes on to say that once the process has been initiated, that relational empathy is tri-phasic. Each phase differs in locus and content. The first phase is the inner process of empathic listening, resonation and personal understanding. The second phase involves expressed empathic understanding. The third stage is received empathy, or empathy based on the experience of the person empathized with. Given this tri-phasic conceptualization, one must tap all three phases in order to represent accurately an individual's empathic ability. This study used Barrett-Lennard's model to conceptualize the process of empathy. A standardized psychological test was used to measure each phase of the empathy process.

In summary, then, the relevant points discussed here concerning the nature of empathy are: 1) there is a long, and still very active, history of the study of the role of empathy in the therapeutic change process, 2) the major theme which pervaded all of the conceptualizations about empathy was the theme of an individual's ability to become involved in the phenomonological world of another, 3) one component of empathy is the ability to become involved with and attend to the communication of other individuals in the external world, 4) empathy is a tri-phasic process which includes: listening, resonation, and personal understanding; expressed empathic understanding; and received empathy, empathy based on the experience of the person empathized with, and 5) in order to represent adequately an individual's empathic ability, all three phases of the empathic process must be measured.

The remaining topics to be discussed in this section are the physiological response mechanisms. All physiological processes in the human body are under the control of neural mechanisms. Through the process of neural activation, messages are received from and transmitted to the brain from all viscera and soma. This process of activation and transmission guides the organism through an ocean of external stimuli.

Readers of this study will have varying degrees of familiarity with these neural mechanisms. A reader who is familiar with this basic neurophysiology need only continue on to the next sections. For the reader who would like to refresh him/herself a review of basic neuro-physiology is presented in Appendix C.

The third concept which this study is based upon is the relationship between physical and emotional events in the human body. While the idea has been with us since antiquity that emotional and physical events in the body are related, the scientific inquiry into this relationship is a recent phenomona.

Webster's dictionary defines emotion as, "a physiological departure from homostasis that is subjectively experienced in strong feelings and manifests itself in neuromuscular, respiratory, cardiovascular, hormonal, and other bodily changes preparatory to overt acts which may or may not be performed". According to this definition, emotional and physical states interact. But how? The James-Lange and Cannon-Bard theories are two of the oldest attempts to explain this interaction.

William James and Carl Lange, independently, proposed a theroy which hypothesized that environmental stimuli automatically arouse and set off various physiological patterns. These patterns are identified by the brain as patterns of specific emotions. The brain then labels these patterns (James, 1884). According to this theory, the brain acts as a passive receptor, scanning all neural input from the viscera. When it identifies a specific pattern, such as sweating palms and a tightening of the stomach , it goes through an algorithmic chain such as, 'stomach tight, hands sweaty, I am anxious'. For this theory to be correct, each emotion must therefore be physiologically distinct.
The Cannon-Bard (1927) theory of emotional arousal disputes the James-Lange theory. Cannon's view is referred to classically as the "fight or flight" theory. Cannon's theory pays particular attention to the evolutionary role which strong emotions play in the preparation of the organism for activity during an emergency. In this theory, the

brain (especially the hypothalamus) both initiates and plays an integral part in an emotionally arousing experience. In the Cannon-Bard theory, the brain is much more than a passive interpreter of visceral information. Cannon demonstrated, experimentally, that when input from the viscera is surgically cut off below the brain, an animal is still capable of behaving "emotionally". Cannon also argued that different emotional states have similar visceral changes. Lindsley (1951) was influenced greatly by research on the role of the brain's reticular formation in maintaining alertness. He hypothesized that the level of arousal was responsible for the type of emotion experienced. He argued that emotion can be viewed as a one dimensional continuum. This continuum ranges from coma at one end to extreme emotion at the other end. The major weakness of this theory is that it can not differentiate clearly between emotions of similar intensity. Lindsley believed, but was never able to substantiate, that different emotions could be detected in EEG rhythms of the brain. Other theorists have proposed numerous other explanations for the relationship between emotional arousal and physical states of the body. Duffy (1934) proposed a theory of "energy mobilization". Hebb (1955) proposed a two factor model which involved a "cue" which gave the emotion a direction. Schacter (1964) proposed a theory involving undifferentiated autonomic patterns and cognitive states.

Numerous theorist and researchers (Clemens, 1957; Dykman, et. al., 1959, 1968; Malmo and Davis, 1956, Lacey and Lacey, 1958) have pointed out that there are low correlations typically found both among physiological measures themselves and physiological measures and emotions. Results, more often than not, prove inconclusive, paradoxical, and contradictory.

Lacey (1956, 1959, 1963, 1974) tries to account for the low correlations found among both physiological measures and emotional states. Lacey (1959) hypothesized that acceptance of the environment or attention to external tasks is associated with cardiac deceleration. On the other hand, rejection of the environment or attention directed inward to internal cues is asociated with cardiac acceleration according to Lacey. He states:

> "...where cardiac deceleration is the rule, the subject is required primarily to note and detect the environment... At the other end, where cardiac acceleration is the rule, one can at least speculate that the opposite of environmental intake is called for. In a sense, then, the acceleration or deceleration of the heart could be considered to be something like an instrumental act of the organism, leading either to increased ease of environmental intake or a form of "rejection of the environment". (Lacey, 1959).

If Lacey's hypothesis is correct, then a decelerated heart rate would be indicative of environmental involvement or intake. If heart rate decelerates during times of environmental intake, then it would be reasonable to assume for this study that a smooth non-labile heart rate might also be indicative of environmental intake. Lacey (1963) later stated that "environmental rejection" (thinking) led to phasic heart rate increases, while "environmental intake" (attention to external events) led to phasic heart rate decreases. Lacey measured subjects' skin conductance and heart rate while they were involved in different tasks. These tasks included: thinking, enduring physical pain, visual attention, and empathic listening. Lacey hypothesized that thinking and enduring physical pain would require the subject to be non-involved in his/her environment-to reject environmental stimuli. Visual attention and empathic listening were believed to require environmental involvement. Results showed that heart rate reactivity either increased or decreased in the hypothesized directions. What was interesting, however, was that skin conductance reactivity increased during all four tasks. In order to explain adequately this discrepancy, Lacey proposed the phenomena of "directional fractionation". Directional fractionation of response is involved in situations where physiological systems do not covary in an arousal like fashion. The idea of directional fractionation directly confronts the "arousal" theories of emotion which were presented earlier. Directional fractionation, however, provides a plausible explanation for the low correlations which are usually found between different physiological systems. Lacey (1967) proposed an underlying biophysiological mechanism to explain this heart rate phenomena. He believes that heart rate increases lead to feedback which inhibits cortical activity. He described neurophysiological studies which traced the pathways from carotid sinus stretch receptors to brainstem mechanisms. This neurophysiological foundation demonstrated that blood pressure changes mediated by baroreceptors in both the aortic arch and carotid sinus produce alterations in reticular formation activity and in cortical excitability.

Dell (Dell, et. al., 1954; Dell, 1957) suggested that the stretch receptors of the carotid sinus produce an inhibitory effect on central vasomotor tone and adrenal secretian by way of Hering's nerve. They demonstrated that sectioning of Hering's nerve abolished the inhibitory effect produced by an injection of epinephine. Bonvallet and Allen (1963) showed that interruption of cardiovascular afferent input leads to a prolonged EEG activation pattern following reticular formation stimulation. Bonvallet and Allen suggested that the normal inhibitory action of the carotid sinus reflex was lost due to interruption of the feedback information on which this inhibitory influence normally depends.

Electrodermal activity was one of the first physiological processes to be explored by psychologists. Jung (1907) used galvanic skin response (GSR) in attempting to understand unconscious processes. He saw this measure as an objective window to the unconscious. Jung's study was the first to relate the magnitude of GSR to the magnitude of an emotional experience. The more deeply an affective image affected you, the more the needle moved around. Archer, et. al. (1972) reported the results of a number of research studies concerning the relationship between skin response and interpersonal situations. From these studies, they concluded..."have reported studies showing relationships between physiological skin responses and various interpersonal situations, and higher response levels may be associated with, or evidence of, <u>increased environmental intake by the organism</u>" (emphasis added). Seligman (1973) found that negative skin potential responses in her subjects were accompanied by feeling described as pleasant. Positive skin potential responses were associated with unpleasant feelings. Edwards and Alsip (1969) explored the effects on heart rate and skin resistance (the inverse of conductance of intake-rejection, verbalization and affect. This research was based on Lacey's theories of intake-rejection and directional fractionation. They presented subjects with four stimulus intake tasks and four stimulus rejection tasks. Each task was administered twice. Once using verbal instructions and once using nonverbal instructions. One month later, subjects were asked to rank order the tasks on a pleasantness-unpleasantness continuum. Two of the intake tasks involved viewing a picture of an attractive scantilly clad girl and viewing a picture of a pile of concentration camp bodies. Results showed significant changes, in the hypothesized directions, for both intake and rejection tasks. No relationships were found between ranking on the pleasant-unpleasant continuum and physiological change. The two intake tasks which involved the viewing of the pictures yielded results which showed directional fractionation of response. Hare et. al. (1971) researched the effects of affective visual stimulation on autonomic responses. Subjects were shown color slide pictures of different situations. These pictures varied in intensity. The purpose was to evoke differential levels of affective arousal. Results of the study showed an increase in skin conductance and a decrease in heart rate in response to the slides. These responses were evident at all levels of stimulus intensity. Blaylock (1972) reports the effects of intake-rejection, verbalization requirements, and threat of shock on heart rate and skin conductance. Subjects were assigned to either an intake or rejection task group. These groups were subdivided into either threat of shock or no threat of shock groups. Results of this study also tended to support the theory that during environmental intake skin conductance increases and during environmental rejection it decreases. Heart rate during environmental intake decreased; whereas, during environmental rejection it increased.

In summary, then, the relevant points discussed here concerning the physiological correlates of emotion are: 1) the arousal theories of emotion cannot account for certain aspects of physiological response patterns of emotion, 2) Lacey's concept of directional fractionation is an attempt to account for the low correlations found between physiological systems and emotion, 3) environmental intake or rejection affects the magnitude and direction of heart rate and skin conductance, and 4) heart rate and skin conductance are responsive to affective visual stimulation.

The last concept which this study bears upon is the relationship between bilateral skin conductance which is measured concomitantly from both hands. The issue of bilateral or asymmetric autonomic activity has recently been receiving much attention (Wyatt and Tursky, 1969; Varni, Doerr, and Franklin, 1971; Giddon and Franklin, 1970). Varni et. al., (1975) stated that it had become increasingly clear that both sides of the body have varying degrees of autonomic activity. Electrodermal activity is clearly the most researched autonomic activity which occurs bilaterally. Numerous investigators have studied recently these bilateral differences (Ketterer and Smith, 1977; Bull and Gale, 1975; Varni, Doerr, and Varni, 1975; Obrist, 1963). Varni, et. al. (1975) explored the relationship between asymmetrical skin conductance levels and awareness of body side. He reports a relationship between awareness of body side and skin conductance level of the contralateral side. Results showed, "when a subject has both reliable bilateral differences in tonic skin conductance and reliable awareness of one body side it is likely that the side of the body reported as the side of awareness will also be the body side of greater tonic skin conductance". An important aspect of this study worth noting is that the skin conductance measure used was the tonic level rather than phasic response. Ketterer and Smith (1977) examined the effects of sex and hemispheric activation on bilateral skin conductance activity. To accomplish this, both a right hemisphere (music) task and a left hemisphere (verbal) task were administered to male and female subjects. Results of this study were not supportive of the findings of Myslobodsky and Rattok (1975) that stimulation of one hemisphere produces greater electrodermal activity on the contralateral side. An additional finding of the Ketterer and Smith study involved bilateral variation in skin conductance level with a formula of: handedness x sex interaction. Tonic levels were higher on the right hand in males and higher on the left hand in females. As in the Varni et. al. study, tonic level of skin conductance was measured rather than phasic response. Bull and Gale (1976) measured response magnitudes, response latencies, recruitment times, and recovery quotients concomitantly from subject's two hands. They found substantial left-right differences on all measures. There was, also, a high linear relationship between concomintant response magnitudes.

All of the articles referenced so far have one thing in common. They all relate observed bilateral skin conductance differences to hemispheric activation of the brain. An alternative hypothesis is presented by Lacroix anc Comper (1979). They state:

> "Electrodermal activity is regulated in part by cortical centers, and although the evidence remains exiguous, it seems that both excitatory and inhibatory centers are found at the cortical level. Moreover, it appears that the influence of excitatory centers may be exerted bilaterally, whereas, that of inhibatory may be lateralized, with the inhibatory effects manifested primarily on the contralateral side".

They hypothesized that differential activation of both hemispheres by behavioral manipulation would cause a lower level of arousal on the contralateral side. This differential activation of the hemispheres was achieved by requiring subjects to perform verbal tasks (left hemisphere activation) and visual-spacial tasks (right hemisphere activation). Their results showed that in dextral subjects, cognitive tasks which were intended to produce differential activation of the hemispheres were accompanied by different patterns of bilateral differences in the amplitude of skin conductance responses. These bilateral differences were opposite in direction with tasks that are strongly lateralized in the different hemispheres. They suggest, finally, that electrodermal measures of differential hemispheric activation may constitute reasonably stable indices of relative hemispheric activation.

Restak (1979) related the work of Galin, who believes that the performance of the right hemisphere is very similar to the operation of unconscious processes. Galin presents two points. The first is that both the unconscious and the right hemisphere deal with images which ordinarily cannot be verbalized. The second point is that both depend more on Gestalt formations rather than logical analysis. Restak goes on further to quote Galin, writing:

> "It is important to emphasize that what most characterizes the hemispheres is not that they are specialized to work with different types of materials rather, each hemisphere is specialized for a different cognitive style - the left for an analytical, logical mode in which words are an excellent lead, and the right for a holistic, Gestalt mode, which happens to be particularly suitable for special relations".

Restak also presents the work of Suberi who has shown, experimentally, the subjects favor the right hemisphere for the memory storage of emotionally charged material.

In the IPR lab during the two years prior to this current study, what appear to be a noticable difference in bilateral electrodermal activity was observed in many subjects. No attempts were made to quantify or determine statistically whether these differences were significant. Before students were scheduled into the lab, they had already been to a number of I.P.R. sessions in the classroom. During these sessions, the purpose of the stimulus vignettes, i.e. "the interpersonal allergy test" was explained. In the lab, the students are asked to view the vignettes as if the person on the screen was speaking directly and personally to them. These vignettes frequently triggered the students rememberances of similar emotional events in thier lives. These observations and the research literature on bilateral differences seemed to suggest that further exploration of these differences might prove fruitful.

In summary, then, the relevant points in this section are: 1) bilateral differences in electrodermal activity have been reported in the literature, 2) these differences may be due to differential hemispheric activation, and 3) some research suggests that hemispheric activation causes contralateral inhibition of electrodermal activity.

Overview

In Chapter II, the literature most relevant to relating cardiovascular, electrodermal, and respiratory activity is presented. Methodology, instrumentation, procedures, analysis techniques, and research hypotheses are described in Chapter III. The results of the study, with the appropriate statistical analyses applied are given in Chapter IV. In Chapter V the conclusions and implications of this study are discussed.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter contains a review of the literature regarding the three physiological variables which are pertinent to this study and a review of the literature on the measurement of empathy. The physiological measures reviewed are electrodermal activity, cardiovascular activity, and respiratory activity. Electrodermal and cardiovascular activity are two of the physiological systems studied most frequently by psychophysiologists. The literature on respiratory activity is considerably more sparse. This chapter is divided into four parts. The first part reviews the literature pertaining to the interpretation of electrodermal activity, the second review is of cardiovascular activity, the third review concerns respiratory activity, and the last review concerns the measurement of empathy.

Electordermal Activity (EDA)

Electrodermal activity was one of the first physiological processes to be studied by psychologists. As early as 1907, Carl Jung used galvanic skin response in trying to understand unconscious processes (Hassett, 1978).

Since its first reported use in 1888 by Féré, there has been little standardization in the techniques used to measure electrodermal activity (Lykken and Venables, 1971). Early reports almost exclusively used the term galvanic skin response (GSR) to describe any electrodermal activity. The term GSR incorrectly came to represent all electrodermal activity. Galvanic Skin Response was measured by placing a subject between a recording amplifier and a bridged circuit. Through the use of a variable resistor, resistance fluctations in the subject were recorded (Lang, 1971). It was assumed for many years that all the procedures which were used to measure electrodermal activity were measuring the same phenomena. Tursky and O'Connell (1966) revealed that early research rarely reported the type of measurement used. It was not until the recording devices used to measure EDA became more sophisticated was it shown that a particular event measured simultaneously by two different methods yielded two distinctly different patterns of activity (Burnstein, Fenz, Bergeran, and Epstein, 1965; Forbes, 1964; Kirkpatrick, 1972; Simons and Perez, 1966).

Skin resistance (SR) and skin conductance (SC) are the two most popular methods used to measure EDA. Skin resistance is an exosomatic process which requires the introduction of an outside current onto the skin to measure EDA. Skin conductance is an endosomatic process.

Skin conductance involves the measurement of the voltage changes in the skin without the introduction of an outside current. Tursky and O'Connell (1966) surveyed researchers in psychophysiology and found little consistency not only in whether exosomatic or endosomatic techniques were used, but also found little consistency in electrode placement, pretreatment of skin surface, type of electrode, type of contact medium, or room temperature and humidity control. There was agreement on one ideal requirement of a recording system - "it be low cost".

Before continuing the review of electrodermal activity, two points still need to be mentioned. The first point concerns the terminology used to describe a particular EDA event. The term "level" means that relatively long periods of time are analyzed (tonic activity), and "response" refers to short duration changes (phasic activity) that occurs in response to a specific stimulus. The final point concerns the relationship between skin resistance and skin conductance. Lykken and Venables (1971) suggest that the use of skin conductance is superior to the use of skin resistance. Treager (1966) showed that sweat glands act like resistors in parallel. As such, an increased conductance gave a directly proportional representation of the number of activated sweat glands. Skin conductance responses also tend to be more normally distributed than skin resistance responses. In this review, the specific type of measurement (i.e. SC, SR, GSR, etc.) will be used unless the article itself is unclear. In that event, the term EDA will be used.

Edelberg (1972) acknowledged that the plantar and palmar surfaces of the body were recognized as responding primarily to emotional and ideational stimuli, and that the majority of the remaining sweat glands in the body were for the purpose of thermal regulation. Sweat gland activity is believed by many to be an indication of sympathetic arousal. Unlike other systems under sympathetic control, the neural transmitter of the sweat glands is acetylcholine (normally a parasympathetic neurotransmitter). It is believed that sweat gland secretion is phasic in nature, occurring as a response to a stimulus. Kuno (1950) proposed another theory arguing that secretion was continuous with sweat being stored in the lumen of the glands until it was forcibly expelled by contraction of the myoepithelial cells. Myoepithelial cells are adrenergic. What is interesting in this theory is that the neurotransmitter is norepinephrine. Since atrophine will block sweating, the production of sweat must therefore be under neural control in Kuno's theory. Another hypothesis of sweat gland activation concerned the role of the vascular system in activation. Lader and Montague (1962) in a series of controlled experiments set out to dispell the belief that vascular activity was responsible for sweat gland activity. They introduced atropine (a cholenergic blocking agent) into the skin and were able to successfully block skin resistance responses without affecting vascular integrity. In a second experiment they introduced an adrenergic blocking agent which produced marked vascular change but no change in electrodermal activity. They interpreted their results as proof that the vascular system did not play a major role in sweat gland activation. Martin and Venables (1967) proposed that sweat gland activity was responsible for skin resistance responses. They based their conclusions on the high correlations frequently reported between sweat gland activity and conduction plus the observation that cholenergic blocking agents abolish both sweat production and skin resistance response. Darrow and Gullickson (1970) viewed the sweat glands as a source of potential changes both positive and negative but also implicated other structures as well. They believed neural impulses caused increases in the permeability of the epidermus and corneum, as well as sweat gland activity.

Edelberg (1972) provided what is probably one of the most in-depth theories of the neurophysiological mechanism of electrodermal activity. Edelberg remarked that both sympathetic and parasympathetic activation have been implicated as mediators of electrodermal activity. He believed generally that control was sympathetic with many parasympathetic characteristics. Acetylocholine as the neural mediator at the neuroeffector site was only one example of the parasympathetic nature of sweat gland activity. Anatomically, there are at least two separate pathways from the brain to the sweat glands. One pathway from the cortex and the other pathway from structures deep inside and brain, including the hippocampus, pons, medulla, hypothalamus, and the reticular system. Interestingly, production of EDA by electrical stimulation of the hypothalamus was accomplished not by stimulation of the posterior nuclei, which are known to be associated with sympathetic effects, but rather by stimulation of the anterior region. Stimulation of the anteria region also produced a slowing of the heart, loss of blood pressure, increased gastrointestinal activity, and other parasympathetic responses. Thus, control of EDA is paradoxical in nature. Edelberg postulated that the reason for this might lie in the dual function of the sweat glands. In addition to the emotional characteristic of sweat gland activity, sweating for thermoregulation purposes exerted a cooling effect that is trophotropic or vegetative in nature, having a routine homeostatic function. Edelberg felt that, more often than not, the vegetative role of the sweat glands is de-emphasized in comparison to the emotional arousal component.

Edelberg and Wright (1964) tested the hypothesis that the palmar galvanic skin response involved the sweat glands and the epidermus, each responding preferentially according to the demands of the behavioral situation. The relative contribution of each were determined by comparing simultaneous GSR's from areas with high vs. low concentrations of sweat glands. The stimuli used in the study were tones and lights which were either alterting signals or execution signals for a perceptual or a motor (reaction time) task. Surprisingly, subjects showed greater relative sweat response to the alerting signal for the reaction time task than to the associated execution signal. Some subjects showed significant differences between alerting and execution signals for the perceptual task. Edelberg interpreted his results as "supporting the hypothesis that two components present in palmar GSR manifest stimulus response specificity, but were inconclusive regarding the nature of the class of stimuli to which each responds". He further concluded "that the differences can not depend on preparation for motor as opposed to non-motor activity".

The research literature has paid much attention to the relationship between EDA and the orienting response (Furedy and Poulous, 1977; Siddle, O'Gorman, and Wood, 1979; Connolly and Frith, 1978; Grahm, 1973; Kimmel, 1973). The orienting response involves the lowering of sensory thresholds, arresting of ongoing physical activity, and muscle tone increases in preparation for action. Bernstein (1969) argued that the fact that there are individual differences in the OR to stimulus change indicates that the perception of stimulus plays a significant role in the OR mechanism. According to Bernstein, "the detection of change is a necessary but not sufficient condition to elicit an OR, and the change must be followed by a judgement of significant or important". Siddle et. al. (1979) reported results of an experiment showing that stimulus change alone was sufficient to produce an increase in SCR amplitude. They believed "that stimulus change alone was sufficient to produce an increase in OR amplitude, and that the relationship between stimulus change and stimulus significance is additive rather than multiplicative". Whether Bernstein's hypothesis is correct or whether Siddle et. al. is correct, clearly, the presentation of a stimulus triggers some degree of EDA.

The nature of the relationship between "emotional" experience and EDA is still very much open to debate. Seligman (1975) measured the skin potential responses of six college students during ten counseling sessions. The Moody Adjective Checklist was administered at least five times during each session, at points where the counselor saw distinctive patterns of skin potential responses.

Results showed that negative skin potential responses were accompanied by feelings described as pleasant. Positive skin potential responses were associated with unpleasant feelings. A study by Kaplan (1963) reported similar results. He measured GSR activity during an interaction between three women and found that increased reactivity occurred at times when there was a negative quality to the interaction.

Flanagan (1967) addressed the relationship between GSR and the startle response. He cited studies showing higher levels of emotional response being associated with smaller GSR's and studies showing that epinephrine, which is also secreted during emotional arousal, also diminished EDA. He used these as evidence to indicate that EDA is associated with attention rather than emotion. Learmonth et. al. (1959) reported a negative correlation between expressivity and increases of palmar skin potential. The higher the palmar skin potential increase the lower the expressivity.

Hastrup and Katkin (1976) tried to develop a self-report inventory which would predict electrodermal lability. One hundred and twenty male subjects were administered an inventory which contained 478 items. The subjects were subsequently tested for electrodermal lability level. Chi-square and correlational analyses were employed to identify items which were significantly related to electrodermal lability. They initially identified 34 items which were significant predictors of EDA lability. A split-sample analysis, however, suggested that the predictors would not replicate. They concluded that although EDA lability is a stable individual difference variable, which predicts certain behavior, subjects cannot identify any attributes of themselves which are related to their differing lability levels. In another study, however, Crider and Lunn (1971) found that electrodermally labile subjects were more introverted than stabile subjects, as assessed by the Welsh R-scale of the MMPI. Lazarus and Alfert (1964) used the MMPI K-scale to identify subjects who had a tendency to not admit to affective disturbances. They showed their subjects films of upsetting scenes and found that these subjects' level of electrodermal reactivity was high.

The three final articles to be discussed in this section are stuides which involve both electrodermal and heart rate responses. The measurement of simultaneous electrodermal and heart rate responses to stimuli is a common practice in psychophysiology research. Two of the studies used filmed stimuli and one study looked at the effects of visual attention on heart rate and skin conductance.

Lazarus, Speisman and Mordkoff (1963) explored the relationship between heart rate and skin conductance as indicaters of stress. In this study subjects were shown motion pictures with varying degrees of stressful material. Continuous recordings of heart rate and skin conductance were made while the subjects watched two films. One film was considered a stress film the other a control film. From these recordings, they derived both intra-individual correlations and inter-individual correlations. Results showed significant differences between the effects of the stressor film and the control film. The control film produced a relaxed state, whereas, the stressor film produced significant increases in both skin conductance and heart rate. Within the stressor film, increases in both heart rate and skin conductance were greatest at points when a crude surgical operation was taking place. The skin conductance response at these points was more variable than heart rate. Lazarus, et. al. computed inter-individual correlations between heart rate and skin conductance for both films. The correlation for the control film was +.301 and the correlation for the stressor film was +.162. Results of intra-individual correlations between heart rate and skin conductance were significantly higher. The correlation for the control film was +.242 and the correlation for the stressor film was +.545. The author's present two conclusions based on these results. First, "there is a reasonable degree of agreement between two of the most widely used indexes of autonomic nervous system reactivity, heart rate and skin conductance". Secondly, "we need not abandon the conviction of many decades that there is substantial generality to autonomic nervous system reactions, and that it is not altogether inappropriate to employ single measures of autonomic reactivity".

Goldstein (1976) studied the physiological responses of repressers, midliners, and sensitizers to affective stimulus vignettes. He also analyzed the physiological responses of the subjects when they were involved vs. non-involved in the vignettes. Subjects were classified as suppressers, midliners, and sensitizers based on their scores on the Byrne Revised Repression-Sensitization Scale. Subjects were shown a series of stimulus vignettes while their cardiac and electrodermal responses were measured. Goldstein taped the IPR recalls of each subject then had raters rate the recall of each vignette for level of involvement with the vignette. His results showed significant differences between the represser and sensitizer groups on skin conductance. A second result of the study showed that there were significant difference between those vignettes in which the subject was rated non-involved and those in which they were rated involved. When a subject was rated as uninvolved s/he had significantly lower skin conductance than when s/he were rated as involved. No significant differences were found for heart rate.

Campos and Johnson (1966) studied the effects of verbalization instructions and visual attention on heart rate and skin conductance. Their purpose was to test Lacey's (1959) theory of directional fractionation of response. Subjects were given three levels of instruction to test the effects of verbalization on heart rate and skin conductance. One level involved subjects merely observing the stimuli presented with no verbalization. The second level involved the subjects being told to observe with the knowledge that they would be required to talk about the stimuli later. The third level involved the subjects being told to observe and describe the stimuli audibly. Visual attention was varied using stimuli of increasing complexity. Subjects viewed a landscape, a hidden figures puzzle, and a maze puzzle. Results of the study did not confirm Lacey's directional fractionation theory. In only two of the nine experimental conditions did heart rate decrease and skin conductance increase and neither of the two were significant. Heart rate decreases were obtained in all of the non-verbalization conditions but none were significant. The imposition of a requirement to speak reversed the direction of heart rate change regardless of the stimulus presented. These increases were significant in four of the six conditions. Verbalization also caused increases in skin conductance but none were significant.

Heart Rate

Lacey's (1959) theory of environmental intake and rejection along with his concept of directional fractionation of response was discussed in detail in Chapter I. In addition, his theory of the neurophysiological mechanism by which heart rate decelerates during environmental intake was also presented. Research has been presented, both in Chapter I and in the first half of this chapter, some of which supported the Lacey hypotheses and some which disconfirmed the hypotheses.

Obrist (1963, 1970; Obrist et. al. 1974) presents a theory of cardiac-somatic coupling which stresses the common sense fact that the heart will beat faster to meet the demands of the tissues for blood. Obrist believes that psychophysiological researchers incorrectly view the biological processes that are involved in the control of behaviorally relevant cardiovascular events as a separate entity from the basic metabolic functions of the cardiovascular system. (This idea is similar to the significance which Edelberg attaches to the vegetative role of the sweat glands). Smith (1954) even argued that the metabolic functions of the cardiovascular system are in essence artifacts of the system. There has been little research conducted to shed any light on the distinction between what might be imply metabolically relevant vs.

behaviorally relevant cardiovascular events. Obrist proposed that the metabolically relevant relationship between cardiac and somatic events is also relevant to behavioral events in two respects. "First, understanding the relationship between cardiac and somatic events is important to any understanding of the biological basis of certain behavioral processes. Second, understanding this relationship provides a starting point or basis for understanding how cardiovascular events can be influenced by factors other than metabolic events".

Obrist (1963) conducted a comprehensive study, the purpose of which was four-fold. One purpose was to determine whether stimuli requiring continual environmental intake will decelerate heart rate. In this study he used stimuli which had not been used in any previous studies. A second purpose was to replicate the previously demonstrated cardiac changes to conceptual tasks and noxious stimuli. A third purpose was to try to determine whether a decrease in afferent baroreceptor activity was indicated by aspects of cardiovascular activity other than heart rate deceleration. The final purpose was to determine whether instances of heart rate deceleration are due either to baroreceptor initiated increases in vagal tonus, as indicated by elevated systolic blood pressure and peripheral vasoconstriction, or loss of sympathetic tonus as measured by skin resistance.

Results revealed that the environmental intake tasks significantly decelerated heart rate, variability of R-R intervals, and systolic blood pressure. The noxious and conceptual tasks initiated sympathetic-like activities in most cardiovascular functions. Systolic blood pressure increased, pulse pressure decreased, and heart rate increased. No evidence was found to support the theroy that heart rate decrease could be the result of increased vagal tonus due to afferent baroreceptor feedback to the bulbar cardiovascular inhibitory centers. Blood pressure and blood flow did not respond in the direction normally associated with sympathetic activity. There was no evidence to indicate that heart rate decrease could be attributed to sympathetic tonus increase. Of special significance was that heart rate decrease occurred in the absence of any indication of baroreceptor reflex inhibition. Heart rate decrease also occurred, at times, in the presence of sympathetic discharge via the sweat glands. Basically, these results supported Lacey's hypothesis of cardic deceleration during environmental intake, but did not support his theory of the mechanism which causes this cardiovascular event.

Klorman et. al. (1975) studied the heart rate responses of subjects while they viewed neutral or aversive stimuli. Forty-five females who were fearful of snakes were shown films of seascapes or snakes. Findings revealed that cardiac response habituated with repeated presentation of the feared stimuli. Hare and Blevings (1975) conducted a similar experiment with women who had phobic fears of spiders and women who had no fear of spiders. Presentation of slides of spiders caused cardiac acceleration in the group who had a phobic fear of spiders. No significant acceleration was found in the no fear group.

Rule and Hewitt (1971) studied the effects of frustration on cardiac responses. They asked subjects to learn lists of verbal material. During the sessions verbal reinforcement was provided. Subjects were given either an easy list with neutral reinforcement, a difficult list with neutral reinforcement, or a difficult list with derogatory feedback. The individuals who were subjected to both frustration and insult did not show any significant differences in heart rate (compared to the other groups) during the learning period.

Klorman and Ryan (1980) exposed subjects who were low in fear of mutilation and subjects who were high in fear of mutilation to repeated presentations of a 6-second tone followed by slides depicting a mutilated body and a 6-second tone of a different frequency paired with a slide of a neutral scene. Their goal was to study heart rate responses during anticipation of affective stimulation. The heart rate reactions of both groups during the anticipation period included an early deceleration, acceleration, and a late deceleration. For the high fear group both the acceleratory and late deceleratory limbs were greater preceeding mutilation than neutral slides. The low fear group lacked the acceleratory reaction. They interpreted these results as indicative of "differential autonomic patterns of anticipation of affective stimulation as a function of individual differences in fear".

Malmo and Davis (1956) report the results of a study in which subjects were presented with a tracing task. Results of the study showed that as performance decreased heart rate increased. Epstein et. al. (1975) studied the magnitude of heart rate and electrodermal response as a function of stimulus input, motor output, and their interaction. Results of the study led the authors to draw four conclusions: "(1) heart rate varies more directly and reliably with motor output than skin conductance, (2) skin conductance is more sensitive to small cognitive than to small motor effects, (3) skin conductance is more reactive to stimulus input than to motor output, while the opposite is true for heart rate, and (4) a strong familiar stimulus presented by surprise elicits a marked heart rate decelerative reaction, usually, but not always proceeded by a smaller accelerative reaction". Bittker et. al. (1975) studied the cardiovascular correlates of sensory intake and rejection associated with interview behavior. Subjects participated in a 15-minute interview during which heart rate, blood pressure, pulse volume, and forearm blood flow were measured. During the interview two observers rated the subjects as to whether they attended or not during the interview. Subjects who were rated high on attention during the interview showed cardiovascular patterns characteristic of peripheral sympathetic nerve discharge (forearm blood flow decrease and decrease in blood flow). In interpreting their results, they wrote the following:

> "The concept of attending and nonattending during interviews or interpersonal relationships deserve further attention. First of all, in an interview the subject needs to direct his attention externally to the interviewer in order to grasp both the content of his instructions and the emotional attitude which will affect his responsiveness."

In another experiment, Obrist (1970) used atrophine on subjects in order to decrease reaction time in a reaction-time task. Obrist hypothesized that if heart rate deceleration causes improved performance, then the pharmacological blocking should lead to longer reaction times. However, if reaction time did not decrease it meant that heart rate deceleartion is a by-product of general somatic adjustment. Results of the study showed that reaction time did not decrease. Obrist viewed this result as confirmation that heart rate deceleration is linked to somatic regulation.

Upon close examination of both the Lacey and Obrist hypotheses, two points stand out. The first point is that both accept the hypothesis that attention to the environment causes cardiac deceleration. The second point is that they disagree over the mechanism which causes the deceleration. Lacey views the mechanism as involving baroreceptor inhibition and cortical activation. Obrist views the decrease as a reduction in the body's somatic activity. Lacey sees heart rate as a cause of central nervous system change and Obrist sees it as a peripheral measure of somatic activity. For the purpose of this study, the mechanism which causes cardiac deceleration is not as important as the fact that there is agreement between the Lacey and Obrist groups that attention to the environment causes cardiac deceleration. What is curious, however, is that both groups adhere to the environmental-cardiac-deceleration hypothesis in spite of contradictory research results. (Lazarus et. al., 1963; Goldstein, 1976; Campos and Johnson, 1966.

Respiratory Rate

Respiratory activity appears, to the uninitiated observer, to be one of the most logical indicators of emotional involvement. Most people have had the experience of taking a deep breath when they feel themselves becoming nervous. Respiratory activity in modern psychophysiological research, however, has been used most often to control for artifacts (Hassett, 1974). The research literature on the relationship between respiration and emotion is sparse. It is interesting to note however, that the first issue of the Journal of Experimental Psychology includes an extensive article on the relationship between respiration and emotion (Feleky, 1916).

Feleky (1916) studied the respiratory changes associated with six emotions. The emotions were: (1) pleasure, (2) pain, (3) anger, (4) disgust, (5) wonder, and (6) fear. Laughter and hatred were also investigated. Three respiratory patterns were studied. There were: (1) duration of inspiration compared to duration of expiration, (2) depth or amplitude of changes, and (3) change in the amount of work accomplished per/unit time. Results showed that in normal breathing, the average time of the inspiration as compared to the expiration was about 4:5. Inspiration took less time than expiration. The inspiration time for laughter was also less than expiration. The opposite ratio was true for disgust, pleasure, anger, pain, wonder, and fear.

Burtt (1921) studied the inspiration/expiration ratio during truth and falsehood. Subject were required in specific instances to respond in truth or to lie to a number of different experimental manipulations. Their inspriations and expirations during these periods were measured. The average I/E ratio for the five breaths following the subjects response was subtracted from the five breath I/E ratio before the response. Burtt hypothesized that the difference should be negative for lying and positive for truthhood. Results showed that the average difference in falsehood was -0.05 and +0.04 for truthhood.

Cohen et. al. (1975) studied the effects of stress on components of the respiratory cycle. Subjects were shown stressful films and their respiratory reactions were measured. The respiratory patterns of the subjects were examined by computer. The computer examined inspiration, expiration, and post expiration pause. While no stress effects were observed on the total inspiration/expiration time, expiration times were longer and pause times shorter during presentation of the stressor films.

Adams (1980) spoke of the active process of inhalation and its relationship to affective responding. He believed that when one is actively involved in a affective experience, changes in the inhalation aspect of respiration might accurately reflect the level of experience.

Measurement of Empathy

Dymond (1949) successfully devised one of the first psychometric instruments to measure the construct of empathy. Dymond defined empathy as "the imaginative transposing of oneself into the thinking, feeling, and actions of another, and so structuring the world of another in the process". The instrument which she devised consisted of four parts. Each part contained six items. On the first part, an individual was asked to rate her/himself on a five-point scale, on each of six characteristics. They were asked to then rate some other individual on the same six characteristics. S/he was then asked to rate the other individual as s/he believed the other individual would rate her/himself. Finally, s/he had to rate her/himself as s/he thought the other individual would rate them.

The subjects in her test development were students in a social psychology class. The students were broken down into groups of six or seven. The rating scale was administered after the group had met three times. Based on the results of this administration, which were significant at the 0.01 level, Dymond concluded that the test measured the construct of empathy.

Truax (1963) constructed a scale for measuring empathy entitled, "A Scale for the Measurement of Accurate Empathy". Truax believed that trained judges, using this scale, could reliably rate the level of empathic understanding of a psychotherapist during a therapy session. In order to achieve this, tape recordings were made of psychotherapy sessions. Sample segments of these sessions were then rated for level of empathic response. The scale was designed to measure a conceptualization of empathy which involved sensitivity to current feelings, and the verbal ability to communicate this understanding in a language which was harmonious with the patients current feelings.

The scale was tested using psychotherapists who were engaged in on-going psychotherapy with schizophrenics. Truax found that the therapists of patients who were independently rated as improved displayed a significantly higher degree of rated empathy than did the therapists of patients rated as deteriorated. Carkhuff (1969) modified the Truax scale and it eventually became one of the most widely used instruments for assessing empathic ability.

Barrett-Lennard (1962) developed an inventory to assess the overall relationship between counselor and client. One subscale of this inventory attempted to assess the level of empathy of the counselor as perceived by the client. The client was asked to rate the counselor on a scale from one to six in response to questions such as "S/he understood all of what I said to her/him". Barrett-Lennard believed that the client was potentially the best judge of the counselor's empathic ability.

From the time of the initial attempts to measure the concept of empathy, the measurement of empathy has been fraught with one consistent major problem. Low correlations have been found between most of the instruments which purport to measure the construct of empathy (Caracena and Vicory, 1969; Kurtz and Grummon, 1972; fish, 1970).

Kurtz and Grummon (1972), in addition to using standard empathy measurements, correlated what they labeled as "predictive measures" of empathy with the more commonly used measures. This approach involved asking a therapist to predict how their client would respond to self-report inventories and personality inventories. This approach seemed to be based on the premise that if the therapist could predict accurately the responses of the client then they must also be empathic. The use of this "predictive empathy" concept was based on the work of Lester (1961) who found no correlation between "predictive empathy" and the therapists perception of his own empathic ability.

Summary

The research reviewed concerning electrodermal activity essentially gave support to the hypothesis that when a subject is involved in his/her environment electrodermal activity increases. A number of theories were presented which tried to explain the mechanisms which cause electrodermal activity.

The research on cardiac activity also gave support, although not overwhelming, that cardiac deceleration was associated with environmental involvement. Two rival theories were presented to explain this phenomona (Lacey and Obrist).

For both cardiac and electrodermal activity the role of vegetative processes were also discussed.

The use of respiratory activity in the measurement of emotions and stress was also presented.

CHAPTER III

METHODOLOGY

Sample

Subjects for this study were drawn from the first year class of medical students in the College of Human Medicine at Michigan State University. The students were enrolled in an initial course in Doctor-Patient Relationships during the winter term, 1981. Eighty-five students were enrolled in the class.

The students who participated in the study were all volunteers. They were offered the opportunity of an alternative laboratory experience in which they were given the chance to study their own physiological responses to affective stimuli (Archer, et. al., 1972). Members of the class ranged in age from 20 to 41. The majority of the students had bachelors degrees. Undergraduate fields of study were largely in the biological and physical sciences.

Seventy students volunteered for the alternative laboratory experience. Only one person failed to show up for his appointment. There were 36 males and 33 females in the experiment. Complete sets of data were collected on 60 subjects.

Procedure

The procedure for collecting the physiological data will be presented in five sections. These sections are: 1) the laboratory circumstance under which the data was collected, 2) the measurement of electrodermal activity, 3) cardiovascular measurement, 4) respiration measurement, and 5) the use of the computer for storing and analyzing data.

The Laboratory Experience

The students who volunteered for the alternative laboratory experience were scheduled for two two-hour lab sessions. When the student arrived s/he was met by an inquirer. The inquirer was trained in both the IPR model and the physiological hook-up procedure. The student was instructed to wash thoroughly with warm water and soap his/her hands and forearms. The student was then seated in a chair in the subject room. The room temperature was maintained between 72^{o} - 74^{o} degrees. The inquirer proceeded to then connect the student to the physiological recording devices.

Once the hook up procedure was completed (see next section for this procedure), a second individual calibrated the physiological recording devices which were housed in a separate room. The inquirer remained in the room with the student. The inquirer gave the student the following instructions before the presentation of the stimulus vignettes. "Make an attempt to imagine that you are alone with the person on the screen. See the person in whatever context makes sense to you, but do your best to react as if the person in the film were speaking personally and privately to you." The inquirer then left the room. The student sat by him/herself in the room for two minutes before the vignettes were projected onto the screen. This was done in order to record pre-stimulus baseline data. The student was then shown the appropriate series of vignettes. The first series of vignettes (lab session #1) consisted of eleven vignettes. The second series (lab session #2) consisted of eight vignettes. All vignettes were inter-personally and/or medically oriented. (Typescripts of these vignettes are found in Appendices A and B). These vignettes varied in length from twenty to ninety seconds. Between each vignette there was a twenty second rest period. The rest period gave the student the opportunity to think about the previous vignette.

A Sony video camera (Model AVC-3200) was placed above a Grass Instruments (Model 7B) five pen recorder. This camera recorded the student's physiological responses to the vignettes. A remote controlled marking devise was used to distinguish the vignettes from the rest periods.

While the first camera was recording the movement of the pens, a second camera (which had been strategically placed to be as inconspicuous as possible) recorded the student's face and upper body as s/he watched the vignettes. A mirrow was placed above and behind the student's head which reflected the vignette that the student was viewing. The reflection was picked up by this second camera. Both the student's image and the vignette were recorded with this camera. The simultaneous inputs from each camera were filtered through a special effects generator (Tel-SS241). All three pieces of feedback information, the physiological recording, the student watching the vignette, and the vignette itself were recorded simultaneously on the same ½ inch Sony recording tape.

While the Grass recorder was recording the physiological responses on its paper, the responses were simultaneously being transmitted to a Digital PDP 11-34 computer. This data was stored for analysis. (The specific method by which this interface was achieved will be discussed in a later section).

After the vignettes were completed the inquirer returned to the room and then conducted an IPR recall session. The physiological information was used to facilitate the recall process. The student watched the videotape on the playback monitor. One half of the screen contained the physiological record as it was unfolding and the other half contained an image of both the student watching the vignette and the vignette itself. At any point which the student chose to stop the tape, s/he saw all three pieces of information simultaneously. A second monitor in the room displayed a computer analyzed synopsis of the physiological responses. The synopsis contained information such as the mean and viariance. A typescript was available for the student to use during recall.

Electrodermal Recording

Electrodermal activity was recorded as skin conductance response. Skin conductance response was measured concomitantly from both hands.

The student had already washed his/her forearms and hands with warm water and soap bofore entering the room. By doing this in advance the student had partially prepared their own skin surface for the application of the electrodes. While applying the measuring devices the inquirer explained the purpose of each device.

The electrodes used for skin conductance measurement were re-usable Beckman silver/silver chloride. The diameter of the conductive surface of the electrodes was 16mm. One electrode was placed on the hypothenar eminance of the palm. The second electrode was placed on the pre-axial surface of the flexor carpi radialus muscle of the forearm. The eccrine sweat glands in the hypothenar eminance are innervated by the palmar cutaneous branch of the ulnar nerve. The sweat glands on the forearm are innervated by the musculocutaneous nerve. Both of these peripheral nerves eminate from the brachial plexus of the CNS.

The surface and cavity of the electrode must be clean and dry before applying to the skin. An adhesive collar was carefully applied to the electrode so that the center hole was directly over the cavity of the electrode. The center cavity was filled with conductive paste (Redux Paste-Hewlett-Packard) making sure no bubbles were introduced into the cavity. The electrode was then affixed to the prepared surface of the skin. This procedure was repeated until all four electrodes were firmly in place.

The lead wire from each electrode was inserted into a metal box which was attached to the subject chair. The output wire from the box was fed directly into a Hagfors Skin Conductance Bridge located in another room. The signal was then fed into a Grass Instruments Low-Level D.C. Pre-Amplifier (Model 7P 1B). The signal was then amplied through a Grass Instruments D.C. Driver Amplifier (Model 7DAE). The operation and calibration procedures for all the physiological equipment is contained in Appendix D.

Cardiovascular Recording

The cardiovascular measure used in this study was heart rate expressed in beats per minute. Heart rate is the recording of the electrical events associated with the muscular contraction of the heart. The rhythm and beating of the heart is controlled by the heart's internal pacemakers; the sinoatrial (SA) and atrioventricular (AV) nodes. The AV node discharges an electrical impulse which forces the contraction of the heart muscle walls. The major nerve which innervates the heart is a branch of the vagas nerve.

Three electrodes were required for the recording of heart rate. An electrode was placed on the pre-axial side of each wrist above the spot where the radius and ulnar bones of the forearm are connected to the metacarpal bones of the hand. The third electrode was placed on the lateral side of the lower leg, choosing a spot where there is little musculature between the skin and fibula bone. This placement was used as a ground.

The electrodes used for the heart rate recording were pregelled disposable silver/silver chloride EKG electrode (Deseret Co., Model 415D). A small amount of conductive gel was rubbed on the surface of the skin before the electrodes was affixed. The conductive gel contained a mild abrasive. By lightly abrading the skin, dead skin was removed from the stratum corneum layer. This was intended to improve the contact points. The conductive gel was wiped thoroughly from the contact area with tissue paper. The electrode was pressed firmly to the skin. The lead wires from all three electrodes were inserted into the input connection box. The output wires were fed directly into a Grass Instruments EKG Tachograph Pre-Amplifier (Model #7P4D). The signal was then amplified through a Grass Instruments D.C. Driver Amplifier (Model #7DAE). The operation and calibration of the tachograph and amplifier are described in Appendix D.

Respiration Recording

Respiration was recorded using a Grass Instruments Volumetric Low Pressure Transducer (Model #PT5). A rubber bellows was placed around the students' chest. The bellows was linked to the volumetric pressure transducer by means of a rubber tube. The bellows was used to transduce respiratory movements into pressure changes. The pressure changes were measured in the chambers of the volumetric pressure transducer. Two bonded strain gauges and a diaphram are in the chambers of the unit. Pressure changes in the chamber causes displacement of the diaphram which in turn activates a cantilever on which the strain gauges are bonded. The strain gauges convert the movements into changes of electrical resistance. This electrical signal is fed directly from the volumetric pressure transducer into a Grass Instruments Low-Level D.C. Pre-Amplifier (Model #7P1B). The signal is then amplified through a

Grass Instruments D.C. Driver Amplifier (Model #7DAE). The operation and caliberation is described in Appendix D.

Computer Interface

Each of the four channels on the Grass Recorder - the two skin conductances, the heart rate, and respiration channels was connected to a Digital 11-34 computer. This was achieved by running shielded electrical cables from each of the Grass Driver Amplifiers to four separate channels of the computer's analog to digital converter.

The computer system used to transform, store, analyze, and display the physiological data was a Digital Equipment PDP 11-34. The confirguration of the computer system included: 1) an 11-34 central processor, 2) two RL01 disk drives, 3) a Digital Decriter II, 4) a VT100 console, 5) an AR-11 analog to digital converter, and 6) an RT-11 V.4 operating system.

The 11-34 central processor contained 64 K words of memory. One word with memory holds 16 bits of information which are binary coded. The two disk drives, RL01, each contain 5-megabites of memory. The VT-100 console is a multi-purpose graphics display monitor on which the student saw the synopsized physiological feedback. After each vignette a graphic representation of the four physiological measures plus intrapersonal statistical information was displayed.

The AR-11 is a 16 channel, 10-bit analog to digital converter. Only four of the channels were used in this study. The conversion process requires the AR-11 to convert the four voltage readings from the Grass recorder (analog) into digital representations using a binary code. The AR-11 is a 10-bit converter, which means that the voltage measures (the analog) are converted into an appropriate digital number between 1-1024. Through this process the voltage variations which cause the pens of the recorder to deflect on the paper also cause the analog to digital converter to register proportional digital variations.

The RT-11 V.4 is the operating system real-time executive. This is the component of the computer system through which all functions of the system are carried out. It is through this real-time executive that all the differential parts of the system are combined into a logical and interactive whole.

The computer languages which are used to run the 11-34 system are Fortran IV and Macro-11. In sampling the physiological data for digital storage, different sampling times were used. For heart rate the computer program sampled once every second. The sampling time for skin conductance response was four times per second. The sampling rate for respiration was five times per second.

At the precise moment that the first vignette appeared on the screen, the computer, by means of the AR-11 analog to digital converter, started to sample the physiological data supplied to it by the Grass Recorder. The digital data was stored temporarily in the 11-34 core memory while the student was watching the vignettes. As soon as the series of vignettes was completed the computer stopped sampling the physiological data and then moved the digital data from the 11-34 core memory to the RL01 disk for indefinite storage. Once the data was stored on the RL01 disk, it was manipulated and translated into the form that was displayed on the VT-100 monitor. Even though the student saw a processed version of the data on the display monitor, the raw data remained stored in its digitalized form on the RL01 storage disk.

Physiological Measures

Two measures were used to evaluate respiratory activity. The first measure was respiratory amplitude. A problem in the measurement of respiratory amplitude was posed by the mechanical and electronic equipment which was used to record respiratory activity. There were inherent differences in amplitude among subjects due to a combination of how tightly a bellows was placed around a subject's chest and/or the level of sensitivity (on the preamplifier) required to keep the recording needle in range. This problem was ameliorated by expressing amplitude variability as a ratio. This ratio was expressed as the standard deviation of each vignette divided by the mean for that vignette. The overall standard deviation for all vignettes combined was then calculated. This standard deviation was the measure of amplitude variability. The second measure was respiratory rate or frequency. This measure also contained an inherent problem. In trying to create a measure of frequency variability, initially, it seemed as though this could be achieved easily by merely computing the variance of the instantaneous frequencies for each vignette. Upon closer inspection, this idea contained one major flaw. Within a given time span a subject who breathes slower will have a greater inherent frequency variance. In order to control for this problem, frequency variability was expressed also as a ratio. The standard deviation for each vignette was divided by the average frequency for the vignette. The overall standard deviation for all vignettes combined was then calculated. This standard deviation was the measure of frequency variability.

Two measures were used to evaluate cardiac activity. The first measure was heart rate change score. This was computed by subtracting the mean heart rate level during the last four seconds of the vignette from the mean heart rate level during the first four seconds of the vignette (Goldstein, 1976). The standard deviation of the change scores for all vignettes combined was computed. This standard deviation was the measure of cardiac change score variability. The second measure used was peak rate smoothed. This was computed by moving averages of order three for each vignette. To compute a moving average of order three each data point, K_i, was averaged with the preceding and succeeding data points, K_{i-1} and K_{i+1}, to yield a smoothed data point. The standard deviation of the peak rate smoothed scores was computed for all vignettes combined. This standard deviation was the measure of variability.

There is considerable debate in the field of psychophysiology over Wilder's (1931) Law of Initial Values (Benjamin, 1963). The Law of Initial Values states that the magnitude of an autonomic response to a stimulus is related to the pre-stimulus level. The law is believed to be applicable to autonomic systems which have both sympathetic and parasympathetic innervation (Hord et. al., 1964). The heart has both sympathetic and parasympathetic innervations. Therefore, the Law of Initial Values needs to be addressed. Benjamin (1963) has shown that if the correlation between pre-stimulus level and stimulus level approaches zero, then the law is not in operation. In order to test this two correlations were computed. The first correlation, between pre-stimulus heart rate level and heart rate change score was -0.087. The second correlation, between pre-stimulus level and heart rate peak score was 0.015. Given these very low correlations the assumption was made that the Law of Initial Values was not in operation. The fact that these correlations were low should in no way effects the results of the statistical procedures. It simply means that on the basis of the pre-stimulus heart rate one could not reliably predict heart rate peak score.

Four measures were used to evaluate electrodermal activity. Electrodermal activity was recorded in micromhos. The sensitivity was calibrated so that one micromho equals one-half centimeter.

The first electrodermal measure involved counting the number of peaks throughout all the vignettes. A peak was defined as at least a one micromho increase followed by at least a one-half micromho decrease. The second measure involved the computation of area under the curve. For each vignette, the lowest point during the first twenty percent was calculated. This point was defined as baseline for computing area under the curve. The areas for all vignettes were added together to provide a total area under the curve. The third measure involved the calculation of slopes. For each vignette, the steepest rise within a 1.5 second period was calculated. This was referred to as the steepest slope for the vignette. The steepest slopes for each vignette were then averaged. The last measure of electrodermal variability was magnitude of response. For each vignette, the largest rise between adjacent minima and maxima was calculated. The largest rises for each vignette were then averaged. For the magnitude to be included it had to be at least a ½ micromho increase. Eccrine sweat glands have no parasympathetic innervation; therefore, there was no need to test for the Law of Initial Values.

Psychological Measures

Three psychological measures were used to assess each subject's empathic level. Each of these measures was chosen to assess one phase of the empathic process. The Affective Sensitivity Scale (A.S.S.) was chosen to measure the first phase of the process. This phase is the inner process of empathic listening, resonation, and personal understanding. The Affective Sensitivity Scale (Kagan and Schneider, 1980) is a standardized norm referenced test which is widely used and purports to assess an individual's ability to detect and identify the affective state of others. The A.S.S. requires a viewer to watch a filmed scene taken from an actual encounter between a physician and patient, a teacher and student, counselor and client, or any of several other natural or professional interactions. After each scene, the viewer chooses from among a group of multiple choice items the one which describes best the last affective state of the filmed persons (Kagan, Werner, and Schneider, 1977). Reliability coefficients for internal consistency and test-retest are 0.75 and 0.65 respectively. All students in the College of Human Medicine were required to take the A.S.S.

The empathy subscale of the Barrett-Lennard Relationship Inventory (Barrett-Lennard, 1962) was chosen to assess the third phase of the empathy process. The third phase is received empathy, or empathy based on the experience of the person empathized with. This subscale consists of specific statements which the patient uses to rate the received empathy of the "helper"; whether it be a counselor, psychotherapist, or physician. Statements such as "s/he tried to see things through my eyes" are responded to on a scale of one to six. One being "Definitely Not True" and six being "Definitely True". Split-half reliability is $r = .86$ and the test-retest reliability is $r = .89$ (Appendix E contains a copy of inventory). As a regular part of the student's Doctor-Patient Relationship course, students conducted 10-minute interviews with patient-models at various times in the course. The patient-models completed the inventory immediately after the interview conducted during the seventh week of class. The physiological measures were correlated with an interview that the students conducted with the patient-models; all of whom presented a problem related to a sexual dysfunction.

The Carkhuff Empathic Understanding Scale (Carkhuff, 1969) was chosen to assess the second phase of the empathy process. The second phase involves the expression of empathic understanding. This scale is a subscale of Truax and Carkhuff's (1967) "A Scale for the Measurement of Accurate Empathy". This scale is perhaps the most widely used instrument for the measurement of empathy. Each students' interview (sexual dysfunction interview) was videotaped. These tapes were then given a global rating from one to five depending on the level of empathy communicated to the patient. (The specific criteria for rating the empathic understanding scale is contained in Appendix F). This instrument has demonstrated considerable ability to descriminate between empathy levels of various groups in the expected direction. Four judges were used to rate these interviews. Three judges were doctoral students in counseling psychology at Michigan State University and one judge was a non-matriculated student. In order to train the judges how to rate an interview on this scale four training sessions were conducted. Each training session was approximately two hours in length. During this time the judges practiced rating "dummy" tapes and came to consentual agreement on what criteria to use as a basis for rating the tapes. Each tape was rated independently by two raters. The inter-rater reliability (using Crohnbach's Alpha) was 0.894.

Stimulus Films

One of the major advances in the study of the relationship between physiological processes and emotion is the use of filmed stimuli (Lazarus and Alfert, 1964; Davison, 1963; Averill and Lazarus, 1968, Kagan and Schauble, 1969). Prior to the work of Kagan etc., psychophysical stimuli were used to stimulate emotion. The use of filmed stimuli more closely approximates the affective situations which occur in real life situations. Lazarus, Speisman et. al. (1963) used films of car accidents and sub-incision rites to provoke anxiety in their subjects. Kagan (1978) describes the affect stimulus vignettes which were developed to enhance the I.P.R. model. He states:

> In numerous I.P.R. sessions we observed that people feared behaviors which, in all likelihood, they would never be subject to....These interpersonal nightmares were often examined during recall sessions if the student was introspective enough and the encounter in the videotape interview stimulated the nightmare sufficiently, but it seemed to us that it might be possible to create a more reliable way of helping people face there interpersonal fears....A series of filmed vignettes were made....actors were instructed to protray various types of affect with varying degrees of intensity.....

The Kagan stimulus vignettes have been used in various research settings with positive results by Goldstein (1976) and Kagan et. al. (1980).

Design

This research was correlational in nature. The basic question it was designed to answer was: what is the relationship between the measures of empathy and the physiological measures? The design, Figure 3.1, was as follows:

Figure 3.1 Design Diagram

	V_1	$V_2 \ldots\ldots V_{19}$
	M_1 M_2 M_3 $M_4 \ldots\ldots M_{12}$	M_1 M_2 M_3 $M_4 \ldots\ldots M_{12}$
S_1		
ASS		
EU		
B-L		
S_2		
ASS		
EU		
B-l		
.		
.		
.		
.		
.		
S_{60}		

Where:
S = Subject
V = Vignette
ASS = Affective Sensitivity Scale
EU = Carkhuff Empathic Understanding Scale
B-L = Barrett-Lennard Relationship Inventory
M_1 = Heart rate change score
M_2 = Heart rate peak score
M_3 = Respiration Amplitude
M_4 = Respiration Frequency
M_5 = Skin Conductance Peaks (RT. Hand)
M_6 = Skin Conductance Peaks (LF. Hand)

M_7 = Skin Conductance Area (RT. Hand)
M_8 = Skin Conductance Area (LF. Hand)
M_9 = Skin Conductance Slope (RT. Hand)
M_{10}= Skin Conductance Slope (LF. Hand)
M_{11}= Skin Conductance Magnitude (RT. Hand)
M_{12}= Skin Conductance Magnitude (LF. Hand)

The second purpose of this research was to test the hypothesis that there would be significant differences between the bilateral electrodermal measures. The design, Figure 3.2, was as follows:

Figure 3.2 Design Diagram

	Right Hand	Left Hand
	M_5, M_7, M_9, M_{11}	M_6, M_8, M_{10}, M_{12}
S_1		
S_2		
.		
.		
.		
.		
.		
.		
S_{60}		

Where:
S = Subject
M_5 = Skin Conductance Peaks (RT. Hand)
M_6 = Skin Conductance Peaks (LF. Hand)
M_7 = Skin Conductance Area (RT. Hand)
M_8 = Skin Conductance Area (LF. Hand)
M_9 = Skin Conductance Slope (RT. Hand)
M_{10} = Skin Conductance Slope (LF. Hand)
M_{11} = Skin Conductance Magnitude (RT. Hand)
M_{12} = Skin Conductance Magnitude (LF. Hand)

Analysis

A matched-pair t-test was performed to test the hypothesis that there were significant differences in bilateral electrodermal activity. This technique was chosen because it does not require that the sample be robust with reference to the assumption of independence. The matched-pair t-test is designed specifically to treat dependent sets of information.

To test the hypotheses that the empathy scores would be correlated to the physiological measures two canonical correlations were computed. Canonical correlation analysis takes as its basic input two sets of variables, each of which can be given theoretical meaning as a set. These sets of variables are known as canonical variates. Rather than trying to account for as much variance as possible within one set of variables, the aim is to account for a maximum amount of relationship between the two sets of variables. Because physiological systems within the human body are interrelated, psychophysiological data systems must therefore be multivariate in nature (Van Egeren, 1973). Canonical correlation is a multivariate statistical procedure. Its use in this study was justified on this basis.

Experimental and Null Hypotheses

I. H_o: There is no correlation between the three empathy scores and the cardiac response scores.

H_1: There is a significant correlation between the three empathy scores and the cardiac response scores.

II. H_o: There is no correlation between the three empathy scores and the electrodermal and respiration response scores.

H_1: There is a significant correlation between the three empathy scores and the electrodermal and respiration response scores.

III. H_o: There are no significant differences between right hand electrodermal activity and left hand activity.

H_1: Right hand electrodermal activity is significantly higher than left hand activity.

Summary

Seventy students in the College of Human Medicine volunteered for an alterantive laboratory expereince. They were videotaped and had their heart rates, skin conductance responses, and respiratopry responses recorded while watching stimulus vignettes. The purpose of the vignettes was to evoke emotional reactions.

The students also conducted ten-minute interviews with patient-models. These interviews were rated on the Barrett-Lennard Relationship Inventory by the patient-model and the Carkhuff Empathic Understanding scale. The students also took the Affective Sensitivity Scale. Their physiological reactions to the vignettes which they watched in the laboratory were correlated, by means of a canonical analysis, with their performance on the three empathy measures.

CHAPTER IV

Analysis

The results of this study along with the relevant statistical analyses are presented in this chapter. The first set of results to be presented will be the correlation matrix upon which the canonical correlations were based. Next the results of the two canonical correlations will be presented. The final results presented are the matched-pair t-tests which were performed on the four electrodermal response measures.

Table 4.1 contains the correlation matrix upon which the canonical correlations were based. Canonical correlation analysis takes as its basic input two sets of variables, each of which can be given theoretical meaning as a set. The basic strategy of canonical analysis is to derive a linear combination from each of the sets of variables in such a way that the correlation between the two linear combinations is maximized. Canonical correlation analysis, rather than accounting for as much variance as possible within one set of variables, instead accounts for a maximum amount of relationship between two sets of variables (Warwick, 1975). Canonical analysis requires

Table 4.1
Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1-BL	1.0														
2-EU	.062	1.0													
3-ASS	-.049	.061	1.0												
4-HRCH	.033	.079	-.169	1.0											
5-HRPEAK	.221	.224	-.185	.269	1.0										
6-RAMP	.201	.191	.059	.125	.296	1.0									
7-RFREQ	.276	.127	-.079	.247	.422	.653	1.0								
8-RTPEAK	-.033	-.066	.041	.041	-.002	.204	.033	1.0							
9-LFPEAK	.201	.164	.022	.030	.419	-.025	.025	.195	1.0						
10-RTAERA	-.016	.041	-.012	.003	.290	.201	.112	.859	.487	1.0					
11-LFAREA	.145	.175	.052	.226	.428	.193	.206	.248	.760	.519	1.0				
12-RT SLO	-.094	.002	-.043	.113	-.027	.037	-.033	.888	.318	.747	.296	1.0			
13-LF SLO	.096	.200	-.054	.143	.332	-.042	-.034	.390	.899	.591	.778	.559	1.0		
14-RT MAG	.102	-.091	-.037	.090	.081	.074	-.003	.910	.334	.844	.302	.985	.550	1.0	
15-LF MAG	.135	.144	-.005	.040	.385	-.031	-.004	.312	.962	.572	.777	.456	.956	.462	1.0

KEY: BL = Barrett -Lennard Relationship Inventory, EV = Carkhuff Empathic Understanding Scale, ASS = Affective Sensitivity Scale, HRCH = Heart Rate Change Score, HRPEAK - Heart Rate Peak Smoothes Score, RAMP = Respiration Amplitude, RFREQ = Respiration Frequency, RTPEAK = Skin Conductance Peaks--Right Hand, LFPEAK = Skin Conductance Peaks--Left Hand, RTAREA=Skin Conductance Area-Right Hand, LFAREA = Skin Conductance Area-Left Hand, LFSLO = Skin Conductance Slope-Left Hand, RTSLO = Skin Conductance Area Right-Hand, RTMAG = Skin Conductance Magnitude-Right Hand, LFMAG = Skin Conductance Magnitude-Left Hand.

that the individual canonical variates within each set not be highly correlated with each other. When these variates are highly correlated, redundant information enters into the analysis. Depending on the nature of this redundancy, this can result in the eigenvalue for that particular set of variates to be greater than one. Eigenvalues of greater than one cause an immediate default in the canonical analysis program. The exploratory nature of this study made it difficult to predict in advance which respiration and electrodermal activity measures would not be highly correlated with each other. The measures which were used to characterize physiological lability in this study were created specifically for this study (with one exception) had not been used in past research. Therefore, by creating an overall correlation matrix between all empathy and physiological measures a more informed decision was made on which of the physiological variables were to be entered into the canonical analysis.

Since there had been little previous research data on the relationship between empathy and physiological response measures, it was difficulty to decide in advance which physiological measures and which empathy measures should be used in the canonical analysis. The use of the correlation matrix was seen as a tool in the decision making operation.

Based on the correlation matrix contained in Table 4.1 the decision was made to include only the heart rate peak score in the first canonical variate set because of its relationship to the empathy measures. The second canonical variate set contained all three empathy measures. The results of the canonical correlation between the heart rate score and the empathy scores is presented in Table 4.2.

The first half of the summary table contains six pieces of information. The second column contains the magnitude of the eigenvalues. They are presented in decending order and are equal in number to the number of variables in the smaller set (in this case the smaller set is the heart rate data). The eigenvalues are the proportion of variance shared by the pair of canonical variates to which they correspond. The third column contains the canonical correlations. They are the square roots of the eigenvalues and their meaning is equivalent to a simple Pearson-Product moment correlation. The last four columns contain information relative to the statistical significance of the canonical correlations. Wilk's Lambada is used to test the null hypothesis that there is no residual linear association between the two variable sets after the preceeding canonical variates have been extracted. The chi-square values, degrees of freedom, and the actual significance values are listed in the last three columns (Warwick, 1975). The first canonical correlation in the table accounts for the greatest linkage or relationship between the two sets of variates. When there is a second canonical correlation in the table it accounts for the degree of relationship in the reduced matrix after the primary relationship has been extracted. The second half of the table presents two matrices of standardized canonical variate coefficients, one for each of the two variable sets entered into the analysis. These give the exact information on the composition of the corresponding pairs of canonical variates which produced the canonical correlations given in the first part of the table. The size of the coefficients are indicative of the relative contribution of the original variables in composing the canonical variates.

Table 4.2

Canonical Correlations

Number	Eigen-Value	Canonical Correlation	Wilks Lambda	Chi-Square	D.F.	Sig.
1	.12870	.35874	.87130	7.85245	3	0.049

Coefficients for Canonical Variables of the First Set

	CANVAR
BL	.55165
EU	.62233
ASS	-.52662

COefficients for Canonical Variables of the Second Set

	CANVAR
HRPEAK	1.000

Hypothesis I: There is a significant correlation between heart rate variability and the three empathy scores at the 0.049 level. It was initially hypothesized that the direction of the correlation would be negative. Canonical correlation analysis always produces a positive correlation. In order to ascertain whether this correlation was in the expected direction one must look at the initial correlation matrix. Inspection of the matrix provides no clear cut answer to the question of directionality. The matrix contains both positive and negative correlations. However, the magnitude of the individual correaltions seems to indicate that this relationship is positive rather than negative. A plausible explanation for this result will be discussed in Chapter V.

Based on the correlation matrix contained in Table 4.1 the decision was made to include both respiratory scores in the canonical analysis, as the correlation between the two was only 0.422. All of the right hand skin conductance measures were highly correlated to each other (from .859 to .910). In addition, all left hand skin conductance measures were highly correlated to each other (from .760 to .962). The decision was made to therefore only include one right hand and one left hand measure in the analysis. Even though the skin conductance measures were highly correlated they were not perfectly correlated. Because of this fact the decision was made to include in the canonical analysis two different measures of skin conductance. Right hand skin conductance magnitude and left hand skin conductance slope were the two measures included (correlation between the two was .550). An additional decision was made to exclude the A.S.S. from the other set of canonical variates. The correlation matrix revealed that the A.S.S. was negatively correlated to both the other empathy measures and the physiological measures. To therefore include the A.S.S. in the analysis would possibly cause a "washout" effect. A more detailed analysis of the possible reasons for this negative A.S.S. correlation and the "washout" effect are contained in Chapter V. The results of the second canonical correlation are contained in Table 4.3.

Table 4.3

Canonical Correlations

Number	Eigen-Value	Canonical Correlation	Wilks Lambda	Chi-Square	D.F.	Sig.
1	.16856	.41056	.77507	14.26865	8	.075
2	.06779	.26037	.93221	3.93123	3	.269

Coefficients for Canonical Variables of the First Set

	CANVAR 1	CANVAR 2
BL	.42224	.90861
EU	.88068	-.47776

Coefficients for Canonical Variables of the Second Set

	CANVAR 1	CANVAR 2
RAMP	.55576	-.34115
RFREQ	.22222	.93982
RTMAG	-.62798	.80126
LFSLO	.90403	-.45505

Hypothesis II: There is a significant correlation between respiratory and electordermal variability scores and the empathy scores at the 0.075 level. It was initially hypothesized that the direction of the correlation would be positive. Inspection of the correlation matrix provides clear cut evidence of the positive nature of this correlation.

The results of the matched-pair t-tests for each of the four electrodermal measures are contained in Table 4.4.

Table 4.4

Matched-Pair t-tests

Variable	Mean	S.D.	D.F.	t-value	Sig.
Skin Conductance Peaks	10.27	17.66	60	4.69	.0001
Skin Conductance Area	996.45	1460.44	60	5.50	.0001
Skin Conductance Slope	34.84	49.20	60	5.70	.0001
Skin Conductance Magnitude	38.78	58.84	60	5.31	.0001

Hypothesis III: There were a significant differences between right hand skin conductance peaks, area, slope, and magnitude and left hand skin conductance peaks, area, slope, and magnitude. Given the fact that the four measures for each hand were highly correlated to each other it is not surprising that significant differences were found on all for measures.

Summary

The results of the three research hypotheses were presented in this chapter. The first hypothesis was that there would be a significant correlation between the empathy measures and heart rate variability. The canonical correlation between these two sets of variables was 0.35874. The chi-square level of significance for this correlation was 0.049. The second hypothesis was that there would be a significant correlation between the empathy measures and respiratory and electrodermal variability. The canonical correlation between the two empathy measures and the four physiological measures was 0.41056. The chi-square level of significance for this correlation was 0.075. The third hypothesis was that there would be significant differences in bilateral electrodermal activity. The matched-pair t-tests at the .0001 level indicated that this was true.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND IMPLICATIONS

Summary

The exploration of the "helping relationship" has been a major area of study in psychology. Theorists and practitioners have postulated numerous characteristics or skills which the effective helper must possess. The concept of empathy is one of these characteristics. One conceptualization of empathy is that of Barrett-Lennard (1962, 1981). Barrett-Lennard viewed empathy as a tri-phasic process. The first phase was the inner process of empathic listening and understanding. The second phase was expressed empathy. The third phase was received empathy.

Psychophysiologists have devoted considerable attention to the physiological correlates of an individual's accepting and/or rejecting environmental stimuli. This study was an attempt to explore the relationship between the tri-phasic concept of empathy described by Barrett-Lennard and its psychophysiological correlates. Three physiological measures were analyzed. The measures were heart rate, skin conductance, and respiration. Lacey (1959) and Bittker et. al. (1975) have found that acceptance of the environment or attention to external tasks is associated with cardiac deceleration. Rejection of the environment or attention directed inward to internal cues is associated with cardiac acceleration. A major hypothesis of this study was derived from Lacey. It was hypothesized that if an individual attended to and was involved with filmed vignettes that his/her heart rate would become consistant--less labile. If an individual was uninvolved with the vignettes the converse would be true, i.e. more labile.

The research of Edelberg (1972) and Lazarus et. al. (1963) provided the theoretical basis for predicting that involvement with the filmed vignettes would cause skin conductance to be labile and reactive. Lazarus et. al. (1963) showed that watching arousing motion pictures caused electrodermal activity to become more labile.

It was hypothesized that a subject's global empathy rating would be significantly correlated to his/her physiological lability. A positive correlation was hypothesized for skin conductance and respiration, and a negative correlation was hypothesized for heart rate. An additional hypothesis which was generated from this study was that there would be a significant difference in bilateral electrodermal activity. This hypothesis was based on the work of Lacroix and Comper (1979) and Myslobodsky and Rattok (1975).

Sixty students from the first year class in the College of Human Medicine at Michigan State University volunteered to participate in this study. They were offered the opportunity of an alternative laboratory experience in which they were given the chance to study their own physiological responses to affective stimuli. Each subject was scheduled for two two-hour sessions in the laboratory. During the first session the subjects viewed eleven stimulus vignettes. During the second session the subjects were shown eight vignettes. While they were viewing the vignettes, their heart rate, respiration, and skin conductance were measured; simultaneously, this information was transmitted to a computer where the data was stored for subsequent analysis. In addition, students conducted weekly 10-minute interviews with patient-models as part of a course in Doctor-Patient Relationships. During the seventh week of the class the students interviewed patient-models who presented a problem about a sexual dysfunction. These interviews were rated by trained raters on the Carkhuff Empathic Understanding Scale. In addition, the patient-models rated each subject on the empathy scale of the Barrett-Lennard Relationship Inventory. These two ratings were used to assess the second and third phases of the empathy process respectively. All students in the College of Human Medicine were required to take the Kagan and Schneider Affective Sensitivity Scale. The score from this scale was used to assess the initial phase of the empathy process.

Three statistical analyses were performed on the data to assess the results of this study. A canonical correlation was calculated to analyze the relationship between the three empathy measures and the heart rate data. Results indicated that there was a significant relationship between global empathy and heart rate peak score. A second canonical correlation was performed to analyze the relationship between two of the empathy measures and the respiration and skin conductance data. Results indicated that there was a significant relationship between two of the components of global empathy and a combination of the respiration and skin conductance data. The final analysis involved the relationship between right hand and left hand skin conductance activity. A matched-pair t-test was used to analyze each of the four skin conductance measures. Results of these analyses indicated that there were significant differences between right hand and left hand skin conductance activity.

Conclusions

1. A significant correlation exists between a subject's heart rate variability, as measured by heart rate peak score, and the global concept of empathy, as measured by three scales which purport to measure different aspects of empathy. This correlation was in the positive direction; which was opposite to the hypothesized direction.

2. A significant correlation exists between a subject's respiratory and electrodermal activity, as measured by respiration amplitude and frequency and right hand skin conductance magnitude and left hand slope, and empathy, as measured by two of the three scales, the Barrett-Lennard and the Carkhuff.

3. A significant difference exists between right hand skin conductance response to affective stimulus vignettes and left hand skin conductance response to the vignettes. The characteristic of skin conductance response measured was number of peaks.

4. A significant difference exists between right hand skin conductance response to affective stimulus vignettes and left hand skin conductance response to the vignettes. The characteristic of skin conductance response measured was area under the curve.

5. A significant difference exists between right hand skin conductance response to affective stimulus vignettes and left hand response to the vignettes to the vignettes. The characteristic of skin conductance response measured was slope.

6. A significant difference exists between right hand skin conductance response to affective stimulus vignettes and left hand response to the vignettes. The characteristic of skin conductance response measured was magnitude of response.

Discussion

The hypothesis that heart rate would be related negatively to global empathy level was not substantiated. It was, however, related significantly to global empathy in a positive direction. There are any one of a number of plausible explanations for this phenomena. One possible explanation is that Lacey's hypothesis, which stated that environmental involvement caused cardiac deceleration, was incorrectly modified in this study. In this study, the hypothesis was modified to also equate environmental involvement with a more stable--or less labile heart rate. While it seemed logical that deceleration and stability should be related, perhaps they are not related. It is also quite possible that during the vignettes heart rate did decelerate, but that the actual process of deceleration was measured as variability. Another plausible explanation lies in the emotional content of the vignettes. Most of the research literature on the environmental intake-cardiac deceleration hypothesis used tasks such as visual attention, tracking tasks, puzzles etc. to stimulate subjects to attend to the environment. In fact, the studies which used either slides, films, or interviews which had strong emotional events (Lazarus, 1963; Goldstein, 1976; Campos and Johnson, 1966; Hare and Blevings, 1975; Bittker et. al. 1977) either showed heart rate acceleration or no significant deceleration. This might necessitate a reformulation of the

Lacey hypothesis to be more specific as to the type of environmental event. It is possible that emotionally evocative external events require the organism to prepare for engagement in an external event, which in turn requires an increase in cardiac response. A third plausible explanation might be related to the Obrist (1970) cardiac-somatic coupling hypothesis. Obrist stated that the vegetative requirement of the organism is the primary determinant of cardiac acceleration and deceleration. Maybe emotional environmental events increases muscular activity, or increases gastrointestinal activity, or some other physiological process that demands an increased need for oxygen. These contrary results might merely have been caused by an unknown "noise" in the recording system i.e. an undetected fault in the equipment. Finally, one can not rule out the possibility that Lacey's hypothesis that cardiac deceleration is associated with environmental involvement is simply in error.

The results of this study with reference to respiration and skin conductance were significant in the hypothesized direction. The magnitude of respiratory and electrodermal lability was significantly correlated to global empathy level. The greater the global empathy level the greater the respiratory and skin conductance variability.

The Affective Sensitivity Scale was not included in the global empathy rating for the correlation with respiratory and electrodermal lability. The ASS was negatively correlated with the other two empathy measures and with the respiratory and skin conductance measures. The inclusion of the ASS data in the canonical analysis would create a possible wash-out effect. Therefore, the decision was made to exclude it from the analysis. There appears to be two plausible explanations for the ASS being negatively correlated to the other empathy measures and the physiological data. The Barrett-Lennard data and the Carkhuff data, while not correlated with each other, were derived from the same interview. It is possible that although they were not correlated with each other they still cannot be considered as independent. Any two sets of information derived from the same behavioral set might in some way be dependent on each other. However, inspection of the data would not always reveal the nature of this dependence. The ASS data was not based on the patient-model interview. The second possible explanation of the negative ASS correlation concerns the circumstances surrounding the administration of the ASS. The ASS was administered to the students the term before the Doctor-Patient Relationship class and the experiment were conducted. There was a 2½-month lapse in time between the administration of the ASS and the collection of the Barrett-Lennard and Carkhuff data. Many historical and maturational events could have effected the internal validity of the analysis (Campbell and Stanley, 1963).

In addition, the A.S.S. was administered to the students the day before their first-ever set of final exams in medical school. The anxiety level of the students was higher than normal. The effects of anxiety on performance are well documented (Mandler and Sarason, 1952; Spence and Farber, 1953; Spielberger, 1966). This could account for the A.S.S. data being negatively related to all the other data. The A.S.S. was not specifically designed to measure empathy per se, but was designed to measure ones ability to accurately perceive the feelings of others. When an individual scores high on the instrument, rather than being indicative of a highly empathic level, it might be indicative of a highly developed adaptive defensive posture (a form of vigilance--a coping style). This might also account for the negative correlation between the A.S.S. and the other empathy measures.

An additional finding of this study concerns the relationship between the three empathy measures. The intercorrelation between the three empathy measures was very low. They ranged from -0.049 to 0.062. The findings of this study are in keeping with the low correlations that are typically reported between empathy measures (Caracena and Vicory, 1969; Kurtz and Grummon, 1972: McWriter, 1973; Fish, 1970; Lesser, 1961). Some of the research in this area has used the same three measures which were used in this study. There have been basically two hypotheses developed to explain this apparent incongruity. One theory relates it to the client's inability to discriminate in interpersonal situations or the client's inability to objectively view the therapist. Another view is that only those capable of offering high levels of facilitative conditions are able to discriminate accurately such conditions in others (Boroto et. al. 1978). The assumption is made frequently that all the instruments are measuring the same variable. This assumption is one of the major shortcomings of research using these instruments. These instruments are in all likelihood measuring different stages of the empathic process. The empathic process can be viewed as a developmental continuum with successful completion of one stage being contingent upon some degree of completion of the previous stage. An individual could conceivably accurately perceive the affective experience of another but be unable to communicate this to the other. Were the experimenter to test both ability to accurately perceive and also communicate empathy; this individual would score higher on perceived than expressed empathy. When empathy is viewed from this developmental paradigm the measures should not be expected to be highly related. Another alternative explanation of the low correlations typically found between measures might be due to an independence rather than a relatedness of the measures. Contrary to the above mentioned additive developmental continuum, empathy might not be an additive process. It might not necessarily build upon previous stages.

An individual who is weak in one sphere, for example the ability to accurately perceive the feelings of others, might compensate by responding to another in ways that are perceived by the other as empathic.

Bilateral or assymmetric autonomic activity has received considerable attention in recent psychophysiological literature. Bilateral electrodermal activity is one of the more actively researched of the autonomic processes (Ketterer and Smith, 1977; Bull and Gale, 1975; Varni et. al. 1975; Obrist, 1973). The most popular explanation of this asymmetric phenomena equates bilateral differences to hemispheric activation. Hemispheric activation, in these theories, leads to contralateral increases in electrodermal activity (EDA). Lacriox and Comper (1979) presented a rival hypothesis which stated that hemispheric activation caused contralateral inhibitation of EDA. The results of this study showed significantly greater EDA on the right palmar surface while subjects watched affect stimulus vignettes. This finding can be interpreted within the context of both the activation and inhibitation hypotheses. The activation theorists would equate increased EDA on the right palmar surface to left hemisphere activation. Inhibition theorists would interpret these results to mean that the right hemisphere was activated. There is little disagreement amongst researchers that in all tasks there is some level of activation in both hemispheres. The task here is to try to assess which hemisphere was the predominant one during the task involving the viewing of affect laden vignettes. Galin (in Restak, 1979) believed that the right hemisphere is associated with unconscious processes and deals with images which ordinarily cannot be verbalized. Suberi (in Restak, 1979) showed experimentally that subjects favor the right hemisphere for the memory storage of emotionally charged material. The students in this study were asked to view the vignettes as if the person on the screen were speaking directly to them. In addition, the students were given the analogy that the stimulus vignettes were "an interpersonal allergy test". The vignettes frequently triggered the students rememberences of emotional events which had occurred in the past. In light of the results of this study, one cannot rule out the possibility that the right hemisphere was the predominant one in operation during the viewing of the affect simulation vignettes. One cannot rule out the possibility that if there were right hemispheric activation it could have caused contralateral electrodermal inhibitation. Future research could verify contralateral inhibition by comparing left palmar EDA during the vignettes to activity during baseline and rest periods.

Personal Observations

Personal observations by the experimenter are presented here.

The first observation concerns the students who participated in the project. The vast majority of the students who participated in the alternative physiological feedback lab reported favorably on the experience. They truly seemed excited to be given the opportunity to view their physiological responses in affective situations. First year medical students were very conscious of time requirements and to volunteer for a lab which too 4-hours out of their neuoroanatomy and physiology study time is atypical. The fact that seventy out of eight-five students volunteered for the lab and took the 4-hours out of their schedules, speaks well of their enthusiasm for the projects. Many of the students expressed desire to have the lab made a required part of the Doctor-Patient Relationship course; rather than an optiaonl experience.

From a research standpoint, the use of ambiguous stimuli (the vignettes) more closely approximates events in the real world than photic flashes and cold pressor tests. Results of a study which uses this type of stimuli has greater fact validity for interpersonal research than one which uses the more traditional psychophysical stimuli.

Implications for Future Research

One future research need is to replicate this study. Before this study was undertaken, the relationship between the empathy measures and the physiological measures was unknown. The relative contribution of each variable to the relationship was unknown. The basic strategy of canonical analysis is to derive a linear combination from each of the sets of variables in such a way, that the correlation between the two linear combinations is maximized (Warwick, 1975). The canonical analysis determines the relative contribution or weight of each variable. In the replication of this study a predictive analysis procedure should be used. A statistical procedure should be chosen which would use the relative weights of the variables which were derived from this study. These weights could then be assigned to the variables in an a priori manner. Then, a Pearson-Product correlation would be used to test the relationship between the physiological data and the empathy data. If these relative weights reflect accurately the true contributions of the variables, then, a replication study using these weights in an a priori manner should again provide a correlation which is significant.

A second implication for future research concerns the study of physiological systems. Too often, researchers view the systems which they study as univariate in nature.

Respiration is separate from electrodermal activity, which is different from gastrointestinal activity, etc. The human body is an exceptionally complex myriad of inter-related systems. What occurs in one system effects what happens in other systems. Physiological systems of the body are not independent of each other -- they are dependent. They should, therefore, be treated as such. An example of this was seen in the overall correlation matrix which was created in Chapter IV. A review of the matrix showed that individually none of the physiological measures was correlated significantly to any one of the individual empathy measures. This lack of significance using univariate interindividual correlations was in keeping with the non-significance found typically in psychophysiological research. This research, however, took the position, from its inception, that physiological systems could not be treated as separate entitles. The system had to be treated as a whole. Therefore, a multivariate statistical analysis was chosen; with the finding of statistically significant relationships. In this study heart rate was, however, treated separately. This decision was based on Lacey's theory of cardiac deceleration. The hypothesis was made that heart rate would be negatively correlated with the empathy scores. The results of this study showed the opposite to be true. If this study were to be replicated the heart rate data should be added to the respiration and skin conductance data, then, the data could be analyzed together. A post-hoc analysis of this nature was performed which did combine the heart rate measure with the respiration and skin conductance measures. This analysis used only the Barrett-Lennard and Carkhuff empathy measures in the canonical correlation. Results of the post-hoc analysis showed a correlation of 0.422. This correlation was significant at the .134 level. What is interesting is that this combined correlation was as high as the correlations of the separate heart rate and respiration/skin conductance analyses; however, the significance level appeared to be related to the separate correlations in an additive manner. The significance level of the initial heart rate correlation was .049 and the significance level of the respiratory and skin conductance correlation was .075. This was most likely caused by the increase in the degrees of freedom which in turn required a larger Chi-square value to reject the null hypothesis.

Another conceivable area of endeavor for future exploration, while highly speculative in nature, would involve a modification of this procedure so that it might be used in field training of counselors, therapists, parents, etc. This procedure would involve connecting both counselor-client or parent-child to the physiological recording devices and measuring the physiological responses of both individuals during the particular type of interaction. The session could be video-taped and split-screen images of both individuals physiological responses would be super-imposed on the screen. After the interaction is completed, both parties would do a mutual IPR recall with an inquirer who has knowledge of both the recall process and an understanding of the psycho-physiological concomitants of empathy. During recall the physiological measures could be used to identify possible points in the interview where either one or both of the participants report clinically significant empathic feelings. They might then be able to provide each other with more useful feedback as to what about the other's behavior made them feel empathic or non-empathic toward the other.

The final implication for future research is the measurement of variability. One result of this study was the development of a number of ways to characterize the physiological responses. Two characteristics were developed to express heart rate variability, two to express respiratory variability, and four to express skin conductance variability. These eight measures are being used, currently, in the development of cluster analysis programs.

APPENDICES

APPENDIX A

MEDICAL VIGNETTES - SERIES 1

APPENDIX A

Medical Vignettes
Series 1

<u>Older Woman</u>: Oh . . . you're the doctor? You're so young. (Pause) Could I see someone, um . . . just a little older?

<u>Woman</u>: The tests are in. I . . . don't have cancer, do I? I don't . . . I don't have cancer, do I?

<u>Young Women</u>: You want to talk to me? I don't want to talk to you. I don't want to talk to you. Leave me alone. Get away from me. Leave me alone. (Screaming) <u>No</u> . . . I don't want to talk . . . <u>no</u> leave me alone . . . no, no . . .

<u>Young Man</u>: Alright I took your advice. Ha . . . your advice - now look at the mess I'm in. Thanks a lot.

<u>Older Woman</u>: We've been to so many doctors who are <u>just awful</u>. But I'm sure you'll be able to help us.

<u>Man in Chair</u>: This is very hard for me. This is hard for me to talk about. Even . . . to think about (gags, vomits).

<u>Woman</u>: What's the matter? I'm not good enough for you? (Pause) You bastard!

<u>Older Woman</u>: Are you in charge? Are you really in charge? Oh, my God . . .

<u>Young Woman</u>: What are you? I mean . . . what, what's your background? Well, you know what I mean. What are you? (Smiles)

<u>Young Women</u>: Do you want me to level with you? Alright - I'll level with you. You're just a slob - a goddamn slob.

<u>Young Women</u>: I don't want to talk to you. Just stay away. Just stay <u>away</u>. Just stay . . . (Screaming and tears off blouse).

APPENDIX B

MEDICAL VIGNETTES - SERIES 2

APPENDIX B

Medical Vignettes
Series 2

Man at Desk: The reason I wanted you to stop by is we've gotten into a bad situation. We just got a phone call - the little Synder boy - his father was just in a car accident . . . killed, instantly. Now I think it's best if you tell him.

Men in Conference: Oh, hi, Glad you could make it. Say, would you mind taking notes?

Man in Bar: Bitch. We know what she needs, huh? We know what she needs . . .

Woman: Oh, don't give me that crap. You were in charge, dammit. You were responsible. Just don't give me that crap.

Woman: What's the matter, grumpy? Wrong time of the month for you?

Young Woman: You want to know what I've been thinking about? I want you. I've been thinking about it a lot. The way you smell. The way that you touch me. I want to feel you.

Young Man: You know, you really make me feel very, very special. I really look forward to having this time with you and to just being able to let the whole day . . . melt away. I'm really glad you're my friend. You really mean a lot to me. You really do.

Young Man: I really like you. I really like . . . being with you. Uh . . . do you have any idea what you do to me? I just want to touch you. I just want to reach out and feel your warmth. I want to smell you. Just like animals.

Older Man: Can you give me a minute? Something has been driving me frantic. For the last few years I've found myself . . . thinking about . . . little children. Wanting to touch them - where I shouldn't. I know it's wrong, I know it's evil, I know it's unnatural. I can't help myself. Please help me. You've got to help me.

APPENDIX C

BASIC NEUROPHYSIOLOGY

APPENDIX C

Basic Neurophysiology

Virtually all body processes are controlled or influenced by neural activity; therefore, a discussion of basic neurophysiology is presented in this Appendix.

The nervous system is composed of billions of neurons (nerve cell bodies and their processes). The sites of which the nerve cell bodies and their processes contact each other are called synapses. At the synaptic cleft chemical mediators called neurotransmitters are released. These neurotransmitters transmit impulses between the cells. The process by which the chemical neurotransmitter is released into the cleft is called an "action potential". Action potentials are created by the depolarization of the cell membrane. Action potentials occur when there is a "depolarization" and then "repolarization" of the cell membrane. During the depolarization phase the electrical charge of the membrane reaches a point called the "threshold". At the threshold point the action potential or "nerve impulse" occurs. It is at this point that the neurotransmitter is released into the synaptic cleft. This is a simplified version of what is a very complex interaction between electrical and chemical events in the nerve cell. (Schmidt, 1978).

Nerves are composed of bundles of nerve fibers. The body's nervous system is divided into two parts; the Central Nervous System (CNS) and the Peripheral Nervous System (PNS).

The Central Nervous System consists of the brain, midbrain, pons, medulla, spinal cord, and other anatomical divisions. The Central Nervous System contains most of the body's nerve cells. The Central

Nervous System, through the brain, is the control center of the body. The brain functions primarily as the site where neural information is received, processed, integrated, and responses returned in the form of motor signals. Electrical signals are transmitted at speeds up to 120 meters/second (Adams, 1980).

The Peripheral Nervous System consists of 12-pairs of cranial nerves, 31-pairs of spinal nerves, and the large portions of the efferent autonomic nervous system and the accompanying afferents which lie outside the cranial and spinal nerves. Branches of the cranial and spinal nerves spread out and innervate almost all body structures. The primary function of the Peripheral Nervous System is to transmit sensory and motor information to and from the Central Nervous System (Foley, 1977).

All spinal nerves tend to have four types of nerve fibers. The four types of fibers are: (1) General Somatic Afferents, (2) General Visceral Afferents, (3) General Visceral Efferents, and (4) General Somatic Efferents. General Somatic Afferent (GSA) fibers transmit nerve impulses from general body structures (skin, muscles, tendons, etc.) to the central nervous system. These impulses may be interpreted centrally (consciously) as pain, temperature, touch, pressure, etc. However, GSA impulses may, without entering consciousness, activate reflexes or pass to the cerebellum to aid in muscle coordination. General Visceral Afferent (GVA) fibers transmit impulses from viscera (heart, stomach, blood vessel walls, glands, etc.) to the central nervous system and may be interpreted centrally (consciously) as poorly localized pain or even vague pain and discomfort. They may also activate visceral reflexes. General Visceral

Efferent (GVE) fibers are autonomic (sympathetic or paresympathetic) and transmit motor nerve impulses from the CNS to the vicera (smooth muscle of blood vessel walls, intestinal walls, etc.; cardiac muscle, glands of the skin, glands of the walls of the intestinal tract, salivary glands, etc.). General Somatic Efferent (GSE) fibers transmit motor impulses from the CNS to striate (voluntary) musculature of the body and extremities (Foley, 1977).

The Peripheral Nervous System and the Central Nervous System are usually broken down further into the Somatic Nervous System and the Autonomic Nervous System. The Somatic Nervous System consists of nerves which transmit signals to and from sensory and motor organs. This system is sometimes called the voluntary nervous system, as it activates the voluntary muscles (striated). Certain reflexes, however, which are involuntary are under the control of the Somatic Nervous System. The Autonomic Nervous System is referred to frequently as the involuntary or visceral nervous system, as it innervates the internal organs (heart, lungs, sweat glands etc.). Until recently, it was viewed as not being under conscious control. Bodily functions such as temperature, heart rate, blood pressure, breathing, and glandular secretions are under the control of the Autonomic Nervous System. Recent investigations into relaxation, biofeedback, and Eastern Mysticism (Brown, 1974; Green, 1970; Benson, 1974; Pellatier, 1977) have shown that some autonomic functions can be placed under voluntary control. The Autonomic Nervous System, which has been the domain of the psychophysiologist is divided into the Sympathetic Nervous System (SNS) and the Parasympathetic Nervous System (PNS). The

SNS is frequently called the thoracolumbar system because its ganglia meet on the side of the spinal cord. The PNS is referred to often as the craniosacral system due to its emergence from the cranial and sacral regions of the spinal cord.

The Autonomic Nervous System, through the interaction of the SNS and the PNS, plays a crucial role in the regulation of muscle, gland, and organ function. This dynamic interaction between the PNS and the SNS is responsible for maintaining life sustaining processes. These systems create a state of dynamic equilibrum, whereby the various body processes are kept within the narrow range of functioning needed to maintain life regardless of the stresses placed on the individual (Adams, 1980).

The purpose of the PNS is to regulate and maintain an organ's functioning within its tolerable limits. This is called anabolism. The PNS is the predominant system in a relaxed non-stressed individual. When an individual becomes stressed and the various body processes are either heightened or decreased, the PNS acts to return the processes to their natural, tolerable, and homeostatic state. Compared to SNS activation, PNS activation is localized and of relatively short duration (Adams, 1980).

The purpose of the SNS is to meet the body's demands in response to actual or perceived environmental emergencies. This is called catabolosm. SNS activation involves a complex series of responses which include dilation of the coronary blood vessels, increased heart rate, increased blood flow to the voluntary muscles, decreases of blood flow to skin and viscera, and breakdown of glycogen in the liver, just to name a few. In addition, the Central Nervous System transmits signals to the adrenal glands which in turn releases epinephrine into the blood. Within seconds, the blood carries the epinephrine to the body organs where it has effects similar to the SNS (Adams, 1980). Cannon (1927) names this complex chain of events the "fight or flight reaction". Compared to PNS action, the SNS activation is diffuse and can be maintained for periods of up to a few hours.

APPENDIX D

PROCEDURES FOR EQUIPMENT OPERATION

APPENDIX D

A. When ready to run subject

1. take rubber pad from under pens and put pens down on the paper
2. turn dial marked chart and pens from off to chart + pen setting
3. push chart drive from off to mm/min and numerical setting to 25

B. Operation of Heart Rate channel

1. turn driver amplifier from stand-by to on
2. turn polarity switch on driver amplifier from Up Cal to Use
3. turn selector switch on tachograph from off to Cal. Center and label on the paper 80 bpm
4. turn same switch to -2 cm and label 40 bpm
5. turn same switch to +2 cm and label 120 bpm
6. turn same switch to AC slow
7. achieve heart rate record by gently adjusting threshold, dial until flahsing light comes on
8. make sure output display switch is in the tack position
9. make sure 60∿ button is " in " on driver amplifier

C. Operation of Skin Conductance channel

1. turn driver switch from stand-by to on
2. turn driver amplifier polarity switch from Down Cal to Down Use
3. turn skin conductance bridge switch from off to on; subject switch
4. by sure all "mm" switches are at zero (except for recorder sensitivity switch)
5. turn sensitivity switch marked MV / CM to .05 and use zero adjust knob on bridge to return needle to baseline

Operation of Skin Conductance channel - continued

6. turn sensitivity switch MV / CM back to 1 MV / CM

7. turn subject switch to in and adjust pen back to recording range by adding micro mho's on skin conductance bridge,

8. increase sensitivity on bridge (1,2,3, or 4) and/or MV / CM on pre-amplifier until

9. mark off 1 mmho on record using (−+) umho switch to achieve this

10. record mm baseline on grass paper

D. Operation of Respiration channel

1. turn driver amplifier switch from stand-by to on

2. turn polarity switch on driver amplifier from Up Cal to Up Use

3. to bring pen in recording range, using the Balance Voltage controls

4. respiration should now be working

5. to increase or decrease sensitivity adjust the MV / CM switch

E. Grass paper speed

when ready to start experiment turn the paper speed to 100mm/min

APPENDIX E

BARRETT-LENNARD RELATIONSHIP INVENTORY

PLEASE NOTE:

Copyrighted materials in this document have not been filmed at the request of the author. They are available for consultation, however, in the author's university library.

These consist of pages:

122-128

Student______________

Patient______________

Date ________________

APPENDIX E

Relationship Inventory

Although you had a very brief contact with the interviewer, please indicate how you felt by answering the following questions (please circle the number which is most appropriate to how you felt):

1. S/He tried to see things through my eyes.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

2. S/He understood what I said but not the way I felt.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

3. S/He seemed interested in knowing what my experiences mean to <u>me</u>.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

4. S/He seemed to know exactly what I meant.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

5. At times s/he jumped to the conclusion that I felt more strongly or more concerned about something than I actually did.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

6. Sometimes s/he thought that I felt a certain way, because s/he felt that way.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

7. S/He understood me.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

8. His/her own attitudes toward some of the things I said, or did, stopped him/her from really understanding me.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

9. S/He understood what I said but from a detached, objective point of view.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

10. S/He appreciated what my experiences felt like to me.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

11. S/He did not realize how strongly I felt about some of the things we discussed.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

12. S/He responded to me mechanically.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

13. S/He understood all of what I said to him/her.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

14. When I did not say clearly what I meant, s/he still understood me.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

15. S/He seemed able to be deeply and fully aware of my painful feelings without appearing distressed or burdened by them.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

16. S/He was interested in how my physical health was affecting the rest of my life.

1	2	3	4	5	6
Definitely Not True	Not True	Probably Not True	Probably True	True	Definitely True

17. S/He was interested in how any stress in my life was affecting my physical health.

1	2	3	4	5	6
Defintely Not True	Not True	Probably Not True	Probably True	True	Definitely True

APPENDIX F

CARKHUFF EMPATHIC UNDERSTANDING SCALE

APPENDIX F

EMPATHIC UNDERSTANDING

Level 1

The verbal and behavioral expressions of the first person either do not attend to or detract significantly from the verbal and behavioral expressions of the second person(s) in that they communicate significantly less of the second person's feelings than the second person has communicated himself.

Examples: The first person communicates no awareness of even the most obvious, expressed surface feelings of the second person. The first person may be bored or uninterested or simply operating from a preconceived frame or reference which totally excludes that of the other person(s).

In summary, the first person does everything but express that he is listening, understanding, or being sensitive to even the feelings of the other person in such a way as to detract significantly from the communications of the second person.

Level 2

While the first person responds to the expressed feelings of the second person(s), he does so in such a way that he subtracts noticeable affect from the communications of the second person.

Examples: The first person may communicate some awareness of obvious surface feelings of the second person, but his communications drain off a level of the affect and distort the level of meaning. The first person may communicate his own ideas of what may be going on, but these are not congruent with the expressions of the second person.

In summary, the first person tends to respond to other than what the second person is expressing or indicating.

Level 3

The expressions of the first person in response to the expressed feelings of the second person(s) are essentially interchangeable with those of the second person in that they express essentially the same affect and meaning.

Examples: The first person responds with accurate understanding of the surface feelings of the second person but may not respond to or may misinterpret the deeper feelings.

In summary, the first person is responding so as to neither substract from nor add to the expressions of the second person; but he does not respond accurately to how that person really feels beneath the surface feelings. Level 3 constitutes the minimal level of facilitative interpersonal functioning.

Level 4

The responses of the first person add noticeably to the expressions of the second person(s) in such a way as to express feelings a level deeper than the second person was able to express himself.

Examples: The facilitator communicates his understanding of the expressions of the second person at a level deeper than they were expressed, and thus enables the second person to experience and/or express feelings he was unable to express previously.

In summary, the facilitator's responses add deeper feeling and meaning to the expressions of the second person.

Level 5

The first person's responses add significantly to the feeling and meaning of the expressions of the second person(s) in such a way as to (1) accurately express feelings levels below what the person himself was able to express or (2) in the event of on going deep self-exploration on the second person's part, to be fully with him in his deepest moments.

Examples: The facilitator responds with accuracy to all of the person's deeper as well as surface feelings. He is "together" with the second person or "tuned in" on his wave length. The facilitator and the other person might proceed together to explore previously unexplored areas of human existence.

In summary, the facilitator is responding with a full awareness of who the other person is and a comprehensive and accurate empathic understanding of his deepest feelings.

APPENDIX G

CONSENT FOR PARTICIPATION

APPENDIX G

MICHIGAN STATE UNIVERSITY

COLLEGE OF HUMAN MEDICINE

Videotape & Physiological Record Permission Form

Norm Kagan, Ph.D.

I____Volunteer to participate in two lab sessions in which physiological measures and videotape recording of myself may be made.

I agree to this videotaping only under the following conditions:

1) None of these tapes will be shown to anyone other than myself, the instructors, and the evaluation raters.
2) If any research is done with these tapes my anonymity will be protected.
3) The project has been explained to me. I may withdraw at any time without in any way jeopardizing my academic standing.

Witness____________________________________ Date_________________________

Signed_____________________________________ Date_________________________

Your home phone during Winter Term:

____

CW Jan 81

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