PHYSIOLOGICAL AND VERBAL REACTIONS TO A VARIETY OF EMOTIONAL FILM STIMULI

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ABSTRACT

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By

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The present study is concerned with the emotional experience of male subjects viewing filmed episodes of the emotions of anxiety, anger-aggression, sexual arousal, and boredom-control. Assessment of emotional experience was done at both the physiological and verbal levels. The physiological responses recorded during the film stimuli were systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), skin conductance (SC), and spontaneous skin conductance responses (SCR).

The verbal report of an emotional experience was assessed by the administration of a post-movie questionnaire consisting of an emotional adjective checklist, a checklist on awareness of physiological responses and questions allowing the subject to report his reactions and feelings about the experimental procedure.

Multivariate analyses were performed to determine if the different emotional stimuli produced differential emotional and physiological patterns or if these stimuli generated a nonspecific state of physiological or verbal arousal.

The movies did not produce four distinct emotional experiences. Two emotional experiences did emerge from the analysis of the

self-ratings. The first was an anxiety-aggression emotion, which both the anxiety and aggression groups reported. The second, sexual excitation, was experienced by the sexual arousal group. None of the physiological measures identified any specific pattern of response associated with a particular movie.

When appraising their own feelings, a number of subjects rated themselves higher on an emotional experience which did not correspond to their movie group. So, subjects were regrouped according to their highest subjective emotional experience. This procedure also did not find any differences in physiological response dependent upon emotional group.

These findings and the problems encountered in the present study are discussed. Although the results of this experiment cannot directly test an arousal hypothesis of emotion, the results tend to support this position.

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INTRODUCTION

Researchers attempting to study emotions encounter difficulties arising from the nature of emotional experience, the nature of the laboratory as an artificial milieu, and an inability to define a control group or comparison level for an emotion under investigation. The problem with respect to emotional experience, for example, is that one can dissect it into verbal, physiological and expressive or behavioral components (Lang, Rice and Sternbach, 1972). Consequently, emotional experience has undergone considerable fractionation, since investigators have concentrated on some components to the exclusion of others. In psychophysiological research, precision of measurement has led investigators to equate a single variable with an emotional state, such as tension of skeletal muscles measured electromyographically (EMG), with anxiety. Such an equation is both an oversimplification of the complex mechanisms and situations associated with muscle tension and an underestimation of the concept of anxiety (Malmo, 1972).

To guard against such error, Lang et al. (1972) suggest that any adequate theory should account for all three aspects of emotion, and adequate research should use at least two of the three components. Multiple measures in research establish convergent validity to insure that an emotional response is being monitored rather than alternative

responses such as preparation for exercise or circadian rhythms that might well resemble a physiological response to emotional stimuli.

The artificiality of the laboratory situation poses another serious problem to the study of emotions. In an attempt to capture a relatively "pure" emotional state, the investigator asks subjects to exhibit a low frequency response, i.e., a very intense emotional reaction. Most laboratory investigations rarely elicit such extremes in responsivity, because the elicitors of this kind of intense reaction must be of a very specific nature and quality --- a very hostile encounter, an electric shock, or a receptive sexual partner. Ethical considerations often prevent the researcher from using such stimuli. In cases where researchers have bridged the gap, emotional experiences appear to be accessible to measurement. Notable examples are the work on fear and anger reported by Ax (1953), and on sexual excitation by Masters and Johnson (1966).

Furthermore, emotions rarely appear in isolation from one another; rather, similar emotions blend into one another and a single situation will often elicit several emotional feelings within the same individual (Plutchik, 1962). The use of similar stimuli across studies does not always insure that the same emotions are being observed (Barefoot and Straub, 1971). Unfortunately, the stimuli used from study to study often lack even minimal similarity in form of presentation, stimulus quality, quantity (the temporal dimension), or intensity. Comparison of findings on sexual arousal, for example, is difficulty when the data are obtained using stimuli

that range from slides of nude females and false heart rate sounds (Stern, et al., 1972), to pornographic readings (Wenger, et al., 1968), and films of a "bedroom romp," either heterosexual (Adamson, et al., 1972), or homosexual (Bernick, et al., 1971).

A third difficulty in attempting to assess emotions is the inability to define emotional and nonemotional states. As Duffy (1934) has argued, emotion has no specific aspects which separate it from other forms of behavior, i.e., no special characteristics which can be described in either temporal or intensity dimensions. The inability to define a control condition which is nonemotional in turn comes from the lack of specifics in those states called emotional.

Addressing the same issue, but from a different standpoint, Arnold (1970) sees emotion as being an integral part of all behavior. At the very least, an organism must evaluate every experience in terms of like (approach), dislike (avoid), or indifference, which are all considered to be emotional experiences. According to this view, a state of nonemotion does not exist, since every experience carries some emotional evaluation.

Since nonemotional states are so difficult to define, researchers within the field attempt to choose what they consider "non-arousing" stimuli in designing control groups. Often these are slides or films of naturalistic settings (Levi, 1965), or of everyday objects (Hare, 1971). The present study will take the position advocated by Arnold and adopt the state of indifference as a comparison level for other emotions.

Some authors have turned their analysis of emotional versus nonemotional states to the bodily changes which accompany many emotional states. The perception of emotional stimuli is often accompanied by a flushing of the face, a pounding within the head, the heart caught up in the throat, or a sinking feeling within the stomach. Peripheral autonomic and somatic responses have long been recognized as being part of our responses to emotional stimuli. A number of theories have been set forth in an attempt to analyze these peripheral responses.

The peripheral theory. The peripheral theory of emotions states that emotional experience depends on the afferent feedback of skeletal muscles and visceral responses elicited by emotional stimuli (James, 1884). Unlike his predecessors, who viewed emotion as a mental state which projects itself on the body, James proposed that outward expressions of emotions occur before the conscious emotional feeling. In James' example, if one sees a bear, one will run away. After the experience of running, with its concomitant skeletal and visceral changes, the individual will feel fear. Without bodily changes, there can be no emotional experience; feedback from the body to the cortex is the emotion. At the cortical level, emotions are not differentiated according to specific centers within the brain, which, when excited, would elicit fear, anger or depression, but depends on their unique reflexology which rebounds from the "sounding board" of the body. Thus, each emotion possesses its own unique pattern of peripheral activity.

Undifferentiated peripheral responses. In an attack upon the

Jamesian hypothesis, Cannon (1929) elaborated upon the unitary peripheral responses during pain, flight, and fight. He then proposed an alternative theory based upon cortical and subcortical mechanisms. During the above named emotional states, the peripheral action of the body is essentially the same (Cannon, 1929). The body responds to strong emotion by a marked dominance of the sympathetic division (SNS) over the parasympathetic division (PNS) of the autonomic nervous system (ANS). This domination by the SNS is called the "emergency reaction " (Cannon, 1927), since respiration rate (RR), heart rate (HR), and arterial blood pressure (BP) all increase, while the digestive processes decrease together with vasoconstriction of the blood vessels of the skin. There is also a release of adrenalin (epinephrine) into the blood stream which reinforces SNS activity and causes the release of sugar into the blood via the liver. These reactions are an attempt by the body to mobilize its energy resources in the preparation for muscular activity or physical insult. With any high degree of excitation occurring in the central nervous system (CNS), whether it is felt as anger, pain, joy or any other emotion, there will be the same emergency response by the SNS.

In opposition to James' peripheral theory, Cannon views emotional experience as an interaction between the cortex and the thalamic subcortical area. This subcortical area is the neurological region where emotional responsivity is initiated. The cortex is responsible for the inhibition of the emotional centers within the thalamus and insures that emotional expression occurs only under

proper environmental stimulation.

Even though Cannon (1927) cites a great deal of evidence in favor of his central-thalamic theory, his data do not directly address the question of the role of feedback mechanisms from peripheral responses. Emotional experience, for Cannon, results from events within the CNS; bodily reactions during emotions are a result of the overflow of excitation from the CNS to the SNS. Feedback mechanisms are only important in activating the homeostatic processes of the PNS (Cannon, 1929).

Actually, James' and Cannon's observations are not mutually exclusive, for, as Schlosberg (1954) points out, both views can be combined so that central and feedback mechanisms become important parts of the overall emotional experience. Such a theory has been proposed by a number of individuals in the form of an activation theory of emotions.

Activation theory of emotions. Activation theory focuses upon the continuity between emotional and nonemotional behavioral and physiological responses. When Lindsley first introduced the concept in 1951, activation referred to the attention state of the organism, the electroencephalographic recording of brain waves (EEG), and the continuum of behavior displayed by the organism. In Lindsley's presentation, activation theory localizes the brain stem reticular formation as the neurological center responsible for the simultaneous involvement of both cortical and peripheral actions in emotional experience.

Initially, activation specifically referred to cortical arousal

as measured by the EEG. Later, Schlosberg (1954) extended the concept to include multiple measures of both central and peripheral physiological processes which accompany the activity range of the organism from sleep to heightened emotions. Activation is, then, a continuum of physiological activity reflecting the demands of a situation and the degree of organismic involvement with these demands. The lowest activity of EEG, galvanic skin responses (GSR), skin conductance levels (SCL), and muscle tension (MT) should occur during sleep or deep relaxation. As the intensity of the organism's activity mounts, the general index of activation (as measured by the above-named methods) should also increase, reaching its height during strong emotional expression.

Activation theory has two-fold importance for the emotional situation according to Duffy (1962). First, the individual is aware of the physiological changes that accompany the increases or decreases in organ system activity. These changes are interpreted in terms of intensity of energy expenditure in the present situation. Secondly, activation of specific response systems depends on the interpretation the individual gives to the situation, i.e., the direction which responses must take. It is unlikely that an emotional situation will evoke an identical pattern of physiological responses for any two individuals, since every individual interprets a situation idiosyncratically and will respond with his own level of energy release.

In sum, activation theory holds that individual responses outweigh the probability of a response pattern characteristic of the

situation across individuals. Only the two variables of intensity of energy mobilization and direction of behavior are important determinants of specific responses. Any attempt to analyze minute situational patterns only blurs what little continuity the two larger variables may offer.

Situational demands and emotional experience. In emphasizing intensity and directionality, Duffy (1941) anticipated the theoretical and experimental work of Schachter, who stresses the cognitive demands in emotional differentiation. Duffy suggests that when intensity of arousal or direction of behavior is held constant, the other variable can be manipulated within the stimulus situation, thus defining the extent to which each contributes to adaptation in the stimulus context. Schachter and Singer's (1962) study of anger and euphoria exemplifies Duffy's suggestion by controlling the intensity of arousal and manipulating the directionality of emotional behavior. Duffy also parallels and precedes Schachter and Singer in saying that physiological arousal is a necessary but not sufficient source for the specificity of emotional experience. Arousal produces goal-directed behavior within the individual as a search for cognitive labels which define the felt arousal and yield a direction for behavioral expression. The individual's past learning history and the situational determinants provide the label which may be anger, fear, joy, or other emotions.

To test this hypothesis, Schachter and Singer (1962) exposed aroused and nonaroused subjects to different cognitive situations, portraying either anger or euphoria. The emotional setting was

controlled by an experimental confederate who acted either in an angry or a euphoric manner. Aroused subjects were given an injection of epinephrine (E), while nonaroused subjects received a placebo injection of a salt-saline solution. Immediately prior to the emotional situation, subjects were either instructed about the true physiological nature of the symptoms which they could expect, were misinformed about the symptoms, or were told nothing.

All the E-injected subjects reported about the same amount of physiological arousal. Those subjects who were either misinformed or left ignorant about the symptoms of the E-injection imitated the emotional behavior of the confederate and rated themselves as experiencing the emotion portrayed in the experimental setting. Those subjects who were either informed about the E side effects, or who received placebo injections and did not experience self-induced arousal did not imitate the confederate's emotional behavior. Thus, by holding intensity of arousal constant, the direction of the experience and the expression of separate emotions depended upon the individual's cognitive interpretation of the situation.

Emotional arousal in the laboratory. Other studies have used E and norepinephrine (NE) injections in an attempt to reproduce emotional responses in the laboratory setting (Wenger, Clemens, Darsic, Engel, Estees and Sonnenschein, 1960; Frankenhaueuser, 1961, 1971; Sternbach, 1960). In one of the earliest drug injection studies, Maranon (cited in Cannon, 1927) reported that an injection of E alone did not elicit emotional responses. If the drug was presented along with the cognitive elaboration of an emotional

setting or memory, subjects experienced an emotion appropriate to the setting or memory. Most subsequent research supports Maranon's findings that drug injections of E and NE will not lead to an emotional state unless accompanied by an external emotional setting or an internal emotional memory.

Emotions are also induced within the laboratory by the use of deception methods. Ax (1953) aroused subjects to an angry or frightened state by using a hostile experimental assistant and a threatening electric shock. He found anger and fear correspond to NE- and E-like physiological patterns. Funkenstein et al. (1957), Schachter (1957) and Edwards and Tredwell (1967, 1969) have also found NE- and E-like patterns associated with anger and fear.

One of the difficulties with Ax's study and others similar in technique is that relatively long term emotional responses which are elicited cannot be carefully controlled. To circumvent this problem, some researchers focus upon short term responses to stressor and slide stimuli. Sternbach (1960) examined 11 measures of autonomic activity during a startle response to a revolver shot, a cold pressor, E and NE injections, and mild physical exercise. The responses to all stimuli activated the SNS system, but the startle response was associated with a physiological pattern similar to the E injection. The physiological responses to the cold pressor, exercise, and NE injections were all similar to each other and unlike the E pattern.

Slide stimuli of nude females, homicide victims, neutral objects and scenery are used to elicit short term physiological and psychological responses from subjects. Most of these studies focus upon

HR and SC responses within the framework of Lacey's (1970) theory of directional fractionation (Stern, et al., 1972; Hare, 1972). According to this theory, HR acceleration is associated with defensiveness or rejection of external stimuli, while HR deceleration demonstrates an acceptance or taking in of environmental events. Even though initial acceptance or rejection of stimuli may be considered an emotional response (Arnold, 1970), no study has adequately synthesized both verbal report and physiological response to emotional stimuli. Further, the verbalization which is necessary for the evaluation of felt emotion can easily confound the HR response as an index of emotion, since HR decelerates to morbid slides when no rating of emotion is made, and accelerates when such ratings are made (Hare, 1972).

Drug injection methods, stressors, deception, and short term reactions have a number of drawbacks. Drugs by themselves apparently cannot produce emotional responses. Deception, as Lazarus and Opton (1966) point out, can only tap very gross emotional responses. Further, the quality of the emotion evoked is only as good as the deception used. If deception is successful, the experimenter must consider certain issues, such as the real fear experienced by the subjects because they believed that the experimenter would really electrocute them. The deception method also eliminates the possibility of studying a subject more than once, since the chance of a second deception is low. The stressor situation has the problem of artificiality. A subject does not often encounter electric shock or cold pressors in his daily life. Finally, a short term analysis of

responses does not allow for the ebb and flow of emotional experience (Lazarus and Opton, 1966).

Attempts to circimvent thoses weaknesses have focused on film presentations of emotional situations in the laboratory. Films permit continuous recording of responses and analysis of the data in light of the stimulus events. Lazarus and Opton (1966), for example, observed the waxing and waning of HR and SC responses during benign and stressful scenes of a subincision film. Film presentation also offers a range of stimuli which E could not otherwise present, such as heterosexual relations, industrial workshop accidents, and even death. Not all ethical considerations are eliminated by the use of the films, but the subject is one step removed from the real or imagined emotional situation. The subject therefore has a margin of safety and is less likely to be seriously upset. The advantage of removing the subject from the direct emotional situation by using film is also the major disadvantage. Showing a film reliably elicits a vicarious emotional arousal (Barclay and Little, 1972), but little is known about how and why this vicarious process functions.

Studying sexual arousal by film stimuli. Sexual excitation is one of the most widely studied affective states, especially in males, who are readily aroused by showing them pictures of females. The reverse is not so true of females shown pictures of males (Levi, 1965, 1969). As early as 1930, Scott used motion pictures to explore the differences among sex, anger and fear. Using systolic blood pressure (SBP) as his dependent measure, he found that sexual

excitation yielded a large increase in SBP, while anger and fear decreased.

This preliminary finding suggested that the physiological changes during sexual excitation primarily represent an energy mobilization process similar to that described by Cannon (1929). A study by Adamson, et al. (1972) found increases in SBP and diastolic blood pressure (DBP) to a sound (100 db), slides of nude females, and a movie of sexual relations between a man and a woman. All stimuli used produced an increase in physiological responding in the SNS direction. The degree of SNS activation was directly related to the intensity of the stimulus with the film stimulus yielding the greatest reactions.

Contrary to the argument that sexual excitation is merely a representation of energy mobilization, sexual responses are not necessarily accompanied by an increase in 17-hydroxycorticosteroid (17-OHCS) secretion. Penile erection with reported sexual arousal to a film of heterosexual relations, and 17-OHCS secretion have been found by Kling, et al. (1972) to occur independently or together depending on the subject's feelings of guilt and/or anxiety about sex. Sexual arousal does not appear to bear the same relationship to the hypothalamic-pituitary-adrenal axis as does a general state of emotional excitation or stress reaction such as anxiety. In another biochemical study, sexual arousal was accompanied by an increase in acid phosphatase (AP) secretion, while emotions of anxiety, anger, mirth and boredom were not (Barclay and Little, 1972). Sexual excitation is accompanied by SNS activity, while at the same

time, AP secretion appears to be specific to sexual arousal, and the secretion of 17-OHCS is independent of sexual excitation.

Pleasant and unpleasant emotional arousal. In the second half of their study, Adamson, et al. (1972) examined the emotional response to an unpleasant film of a German concentration camp which elicited reported feelings of disgust, sadness, and revulsion. As with the sex film, the authors observed an arousal pattern indicative of SNS activity, i.e., an increase in SBP, DBP, GSR, and a decrease in finger temperature and skin resistance (SR). This morbid film elicited a significantly greater increase in DBP than the sex film with little change in HR. (There is a complete list of physiological abbreviations in Appendix A.)

In a study of sadness and mirth, Averill (1969) found a pattern of SNS activity to a film of the assasination of John F. Kennedy that was similar to the morbid reaction in the Adamson et al. study, i.e., an increase in log palmar conductance (LPC) and GSRs, and an increase in SBP and DBP, with no change in HR. In fact, maximal HR decreased.

Averill showed other subjects a slapstick comedy. This film was accompanied by significant increases in RR, respiration irregularity (RI), HR, LPC and GSR. The comedy situation differed from the sadness film primarily with the increases in RR and RI with no change in blood pressure system. Electrodermal changes were prominent in both situations. Averill concludes that his sadness and mirth films produced different patterns of physiological responding characteristic of the emotional situations which elicited the responses.

Sternbach (1962) found few physiological differences in children's responses to the movie Bambi when he compared scenes judged to be the saddest, scariest, nicest, and funniest. During the sadness scene, there was a significant increase in SR and a decrease in eye blink rate (EOG), suggesting an inhibition of SNS activity. This lack of SNS activity is contrary to the findings of the two studies just reviewed. Sternbach's lack of positive results once again points to the difficulty of studying emotional experience in the laboratory.

Summary of the data. The results of previous studies support both an emergency mobilization and specific patterns interpretation of physiological responses during emotional states. When a resting subject is presented with almost any emotional stimulus, his peripheral physiology responds in the SNS direction. But, different emotional stimuli apparently produce different degrees and/or patterns of SNS activity. Both sexual arousal and sadness, for instance, elicit SNS activity but also follow E- and NE-like activity patterns, respectively.

Statement of the problem. The present study seeks to repeat and extend previous work on the peripheral physiology accompanying different emotional experiences. Much of the earlier research suffers from a lack of standardization of stimuli and responses measured. The present study attempts to overcome these difficulties by an examination of sexual arousal, anger-aggression, anxiety, and boredom-control emotions within the same study. All of the emotions are presented to subjects by the use of films which depict each emotion.

There is also a uniformity in the physiological and verbal measures across emotional situations.

The present experiment generates four possible results represented by a 2 x 2 matrix of differentiated or undifferentiated verbal report and physiological responding. The cells represented by differentiated verbal and physiological responding represent the peripheral theory of emotional responding. The intersection of differentiated verbal report and undifferentiated physiological response corresponds to the emergency mobilization hypothesis. The last possible interaction, undifferentiated verbal response accompanied by differing physiological responding, is not contained in either theory.

The peripheral position on emotion is very difficult to falsify. If no physiological differences are found among the emotional stimuli presented, the theory is often rescued by a logic which states that the emotional stimuli were either too similar or the response measures too insensitive to detect the variations. The emergency mobilization hypothesis is more easily tested and is rejected if the peripheral responses reflect differences in physiological patterning.

Hypothesis. The hypothesis of this study states that the peripheral physiological responses will be undifferentiated across film stimuli, if the film stimuli elicit different emotional experience as expressed by the subjects' verbal reports. In order for this null hypothesis to be rejected, the film stimuli accompanied by differential verbal report will have to show differential physiological

responding.

METHOD

Subjects. Sixty male volunteers from introductory psychology classes at Michigan State University received extra course credit for participation in the experiment.

Independent variables. The independent variables were four emotional videotape settings: sexual arousal, anxiety, anger-aggression, and boredom. The first three films were composed of a two-person interaction within a pseudo-psychodrama episode. The boredom psychodrama featured three individuals. The videotapes were staged, and will be referred to here as "movies" or "vignettes." A full description of these stimuli and their relation to deception is presented below.

The movies lasted from seven to ten minutes. The first few minutes of each movie depicts the "therapist" introducing the "patients" to one another and explaining the procedure for the psychodrama situation. The next several minutes are low in emotional activity. As the movie progresses, the emotional action and tone increase, reaching their peak at the very end.

Description of individual film stimuli. The characters in all the vignettes were college students. The sexual arousal movie opens as the therapist accompanies a young couple into the therapy room. When the therapist leaves, the couple sits down and begin to talk

about their last date. Soon the man begins a number of advances towards the woman by sitting closer to her and placing his arm around her. As the episode continues, the couple begins to kiss and embrace. No clothing is removed and the high point of the vignette occurs as the man fondles the woman's breasts.

Both the aggression and anxiety movies portray two males playing the roles of a father and son. In the anxiety setting, the two men argue about adopting the father and son positions during the psychodrama, neither wishing to be the son. Since one member of this pair is black and the other white, racial epithets are exchanged during the scene, but no physical acting out occurs. In the aggression-anger movie the roles of the father and son are assigned to two white participants. The actors begin a verbal exchange which builds into an argument and peaks as the two push and shove one another and throw chairs at each other. The episode ends just as the father hits the son in the stomach.

In the boredom condition, the participants sit around a table and try to build a skyscraper with an erector set. The emotional quality of the sequence is low key with very little action taking place throughout the entire ten minutes.

Dependent variables. The dependent variables were SBP, DBP, HR, SCL, SCR, and verbal reports as measured on a post-movie questionnaire. A list of abbreviations for the physiological measures is included in Appendix A.

All of the physiological variables were recorded on a four channel Grass model 7 polygraph at a paper speed of 5 mm/sec. SBP

and DBP were recorded using a method similar to Lywood (1967). A standard air-inflation cuff was attached to the subject's (S's) upper left arm with the Korotkoff sounds being detected by means of a stethoscope head placed at the ante cubital fossa.

HR was recorded using standard EKG electrodes in the lead II position with ground attached to the right leg. The signal was amplified by a Grass 7P3 preamplifier. HR was obtained by counting the number of beats in the thirty seconds just prior to each blood pressure cuff inflation. An attempt to measure maximum and minimum HR during the thirty-second interval by the method described by Lockhart (1973) failed at both paper speeds of 5 and 10 mm/sec. Lockhart's method for scoring HR data uses a vernier caliper to measure the peak-to-peak intervals of the R wave. In the present study, width of the ink tracing changed the estimate of HR substantially so that placement of the vernier caliper could not be standardized.

SC was measured using a constant voltage bridge similar to that described by Lykken and Venables (1971). Electrodes were constructed according to Venables and Sayer's method (1963) and were placed on the right palm. The contact area for each electrode was .78 cm^2. Palmar sites were cleansed with 70% ethanol. A 7P1A amplifier was used to amplify the SC and was operated in the DC mode. SC was measured in umhos/cm^2 of electrode area. SCR rate in SCR/minute was established by counting the number of spontaneous or non-specific fluctuations in SC greater than 0.1 umhos during the minute before each cuff inflation.

The post-experimental questionnaire (Appendix B) was given to each S after the movie presentation to assess the emotional and physiological changes S felt during the videotape episode. Two checklists within the questionnaire assessed these reactions. The first asked S to rate his own emotional feelings on a list of adjectives with a scale of one to seven. Secondly, S rated his physiological state on an Own Behaviors Checklist. Physiological changes such as "increase in heart rate," "butterflies in the stomach," and "erection" were rated on scales of one to five. The two checklists were preceded by an adjective checklist in which S had to rate the emotional feelings of the individuals he saw in the psychodramas. The questionnaire ended with two pages of questions that allowed S to express his feelings about the experiment, including any suspicions that the experiment was not as it had been portrayed to him.

Procedure. After volunteering for the experiment, Ss were contacted by E and told that E wished to study the degree to which raters reliably evaluated the feelings which patients express during psychodrama therapy and to see what feelings and physiological changes might take place while individuals rate patients interacting with one another. Since the research requires the measurement of physiological activity, E instructed S to eat his last meal at least two hours prior to testing, to obtain a full night's sleep, and to refrain from the use of drugs and alcoholic beverages at least twenty-four hours prior to testing. All Ss were tested between the hours of 10:00 and 12:00 a. m. and 2:00 to 5:00 p. m., since this routine

best established a homogeneous circadian period for all Ss (Curtis, 1972).

Upon arrival at the laboratory, S waited in the hall for a twenty-minute period for adaptation. During this time, Ss usually read class assignments, since E had instructed them to bring something to study during this time. After the adaptation period, E escorted S to the experimental room and again explained the nature of the experiment. S was given an instruction sheet to read. After he had finished reading the instructions, E emphasized that the rating procedure required S to become as involved as possible with the taped interchange, i.e., S should try to determine as much as possible about the personalities and problems of the patients. The nature of the psychodrama psychotherapy was also explained to each S. He was encouraged to feel what the patients felt in the drama in order to judge what the patients were like. (The set of instructions are presented in Appendix D.)

E then attached the electrodes and blood pressure cuff, explaining the purpose of each as it was attached. Before leaving, E answered any questions which S had, or gave further explanation if needed. The television monitor was turned on, but no picture was presented for five minutes. This second five-minute period was used as a second adaptation period. During the final minute of this period, a nonstimulation baseline was recorded.

After a post-movie measurement was taken for SBP and DBP, E returned to the experimental room, disconnected all electrodes and air cuff, and give S the post-experimental questionnaire.

After S completed the questionnaire, E questioned S about his experiences during the videotape, what he thought the individuals in the tape were like, and what he thought the purpose of the experiment was. This procedure easily allowed E to judge whether or not the deception had been successful. If S did not believe that he was watching real patients in psychotherapy or if he suspected the nature of E's real intent, he was replaced with another S.

Before leaving, S was given a complete description of the study and an explanation of the videotape which he saw. Care was taken to insure that each S left the experimental session with a good feeling about the session and a complete knowledge of the procedures. S was asked to not discuss the nature of the experiment until the end of the quarter when the experiment would be finished. A complete description of the debriefing process is given in Appendix C.

Quantification of the data. SBP and DBP were recorded after the initial minute of the movie and every two minutes thereafter. One minute prior to the movie presentation, there was a sixty-second baseline period, at the end of which a BP reading was taken. HR was scored by counting the number of beats which occurred in thirty seconds prior to cuff inflation. This count was then doubled to yield the rate for the minute prior to BP reading.

SC measures were scored during the fifteen seconds prior to each BP reading. Four measures were scored: the mean SCL was determined by averaging the SCL at the beginning and the end of the fifteen seconds, the maximum and the minimum SCL within the fifteen-second period was scored, and lastly the range in SC during the

fifteen seconds was determined by subtracting the minimum from the maximum SCL. SCRs were scored by counting the number of SCRs in the minute prior to each cuff inflation to yield the rate of SCR/ minute.

Each period which preceded a BP reading was scored. These periods shall be referred to as the "scored periods." Since the videotapes were of different lengths, the total number of scored periods varied with the movie shown. The length of the anxiety, sexual arousal and boredom movies was ten minutes, and the aggression movie was seven minutes. In order to run the multivariate analysis of variance and other statistical tests, the movies had to be equated for number of periods. This task was accomplished by combining some of the scored periods in the longer movies, making their total number of periods the same as in the aggression movie. The combination of scored periods was made on the basis of the intensity of the emotion within the psychodrama vignette. The vignettes were divided into emotional levels. The first minute of each movie consisted of an initial introduction between the "clients." This first period was followed by a low period of emotion, a medium period of emotional arousal, and then the highest period of emotion. The scored periods were combined to correspond to these emotional sections. This recombination of scored periods will be referred to as the "experimental periods." The combination of scored periods within the experimental periods are presented in Table 1. Periods scored for the original record are numbered and placed under their representative experimental period.

Table 1. Combination of scored periods into experimental periods.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	#1	#2	#3	#4, #5	#6, #7	#8
Sexual Arousal	#1	#2	#3	#4, #5	#6, #7	#8
Aggression	#1	#2	#3	#4	#5	#6
Boredom	#1	#2	#3	#4, #5	#6, #7	#8

Note.—Numbers stand for the sequence of scored periods throughout the experiment, i.e., baseline, movie, and post-movie measurements.

From the post-experimental questionnaire, each S was given a rating on the four emotions of anger, sexual arousal, anxiety and boredom. Each S's rating was calculated by taking the mean of his self-rating on the emotional adjectives representing the emotion. The adjectives of "aggressive" and "angry" were used to calculate the aggression mean, "affectionate" and "sexually aroused" to rate sexual arousal, "anxious" and "tense" to rate anxiety, and "bored" and "indifferent" to calculate boredom. Self-ratings from the behavioral checklist were used directly from S's self-ratings. No behavioral items were combined, as on the Own Feelings checklist described above.

RESULTS

In the results that follow, multivariate analyses of variance were performed, but the F values that are reported are the univariate statistics after an overall multivariate F with a probability of $<.05$ or less was found. This is always true, unless an *a priori* prediction is made concerning a specific prediction.

The first analysis divided the rating and physiological data according to psychodrama group to see if the films produced different patterns of responses. In the second analysis, the anxiety and aggression groups were combined and compared with the sexual arousal group while the boredom group was dropped from the analysis. This combination of groups was chosen since, in the first analysis, the anxiety and aggression groups both scored high on self-reported feelings of anxiety and aggression. The sexual arousal group reported the lowest levels of anxiety and aggression, while reporting the highest level of sexual excitation. Thus, the analysis of two groups, an anxiety-aggression and sexual arousal group, appeared reasonable. In the final analysis, Ss were assigned to groups according to their highest subjective experience reported on the post-experimental questionnaire rather than being grouped by the film they viewed.

First analysis. There were three parts to the first analysis. Each part focused in turn on the emotional experience of the subject as expressed on the Own Feelings checklist, on the behavioral checklist, and on the physiological responses recorded during the psychodrama.

Emotional self-ratings. This analysis was performed to determine if the psychodrama episodes each produced different emotional experiences. The means of the self-ratings on the Own Feelings checklist for the psychodrama groups appear in Table 2. The emotional self-ratings which reached a univariate F value of $p < .05$ were examined by the Newman-Keuls multiple comparison statistic (Kirk, 1968). These emotional self-ratings were aggression, anxiety and sexual arousal.

Self-rated aggressive feelings were highest in the aggression and anxiety psychodrama groups. Ss in both the aggression and anxiety groups rated themselves higher on aggression than Ss in the sexual arousal group ($p < .01$ and $< .05$, respectively). The boredom group obtained a score on aggression intermediate between those of the anxiety and sexual arousal groups, and was not significantly different from either of those groups.

The self-rated level of anxiety mirrored the ratings of aggressive feelings. The aggression psychodrama group ranked the highest, followed by the anxiety, boredom, and sexual arousal groups. Again, the aggression and anxiety groups differed from the sexual arousal group, both beyond the $< .05$ level. The boredom group was not significantly different from the other three groups.

On the rating of sexual arousal, the sexual arousal group scored

Table 2. Means of the self-ratings on the Own Feelings checklist for psychodrama groups.

Groups	Self-ratings			
	Aggression	Anxiety	Sexual Arousal	Boredom
Anxiety	3.23	3.96	1.56	2.13
Sexual Arousal	1.90	2.86	3.33	3.13
Aggression	3.76	4.16	1.96	2.30
Boredom	2.80	3.56	1.73	2.73

Note.—Results from the MANOVA for the self-ratings:
Aggression: $F(3,56)=4.67$, $p < .005$.
Anxiety: $F(3,56)=3.53$, $p < .02$.
Sexual arousal: $F(3,56)=9.57$, $p < .00003$.
Boredom: $F(3,56)=1.68$, $p > .05$.

highest, followed by the aggression, boredom and anxiety groups. The sexual arousal Ss rated themselves as experiencing more sexual excitation than each of the other groups at $p < .01$, while the other three groups did not differ from one another.

Behavioral self-ratings. In this analysis, the self-ratings from the behavioral checklist were examined to see if the different psychodrama movies produced different behavioral states. The means of the self-ratings from the behavioral checklist for each psychodrama group are presented in Table 3. The behavioral self-ratings which reached a univariate F value of $p < .05$ were then examined by the Newman-Keuls multiple comparison statistic. These behavioral self-ratings were "making a fist," "butterflies in the stomach," and "erection." The results of the Newman-Keuls tests are presented below.

The aggression group had the highest mean rating on "making a fist," which was significantly different only from the lowest scoring group, the sexual arousal Ss ($p < .05$). On the rating of "butterflies in the stomach," the anxiety group obtained the highest rating, although there were no significant differences among groups. The sexual arousal group rated themselves as experiencing more erection than each of the other three groups ($p < .01$). The other groups did not differ among themsleves on self-reported erection.

In summary, the four psychodrama groups did not differentiate themselves into four separate groups according to their subjective emotional and behavioral reports. However, the anxiety and aggression groups did differ from the sexual arousal group. Both the anxiety

Table 3. Means for the self-ratings on the behavioral checklist for psychodrama groups.

Groups	Self-ratings								
	hitting something	butterflies in the stomach	erection	feel like running	increase in heart rate	laughing	making a fist	sweaty palms	exclamation
Anxiety	1.60	2.40	1.00	1.06	2.80	2.40	2.00	2.33	1.46
Sexual Arousal	1.00	1.46	2.06	1.00	2.60	2.46	1.06	2.00	1.20
Aggression	2.00	2.06	1.20	1.13	2.85	2.60	2.20	1.73	1.80
Boredom	1.60	1.86	1.13	1.13	2.33	2.20	1.80	1.93	1.20

Note.—Results from the MANOVA for the self-ratings:
hitting something: $F(3,56)=2.58$, $p < .06$.
butterflies in the stomach: $F(3,56)=2.77$, $p < .04$.
erection: $F(3,56)=8.56$, $p < .00008$.
feel like running: $F(3,56)= .53$, $p > .05$.
increase in heart rate: $F(3,56)= .81$, $p > .05$.
laughing: $F(3,56)= .34$, $p > .05$.
making a fist: $F(3,56)=2.86$, $p < .04$.
sweaty palms: $F(3,56)= .91$, $p > .05$.
exclamation: $F(3,56)=1.58$, $p > .05$.

and aggression groups experienced the highest levels of anxiety and aggression, while the sexual arousal group reported experiencing the least of these emotions. The sexual arousal group clearly reported more sexual feelings accompanied by erection than the anxiety, aggression, and boredom groups. All four psychodrama groups reported similar levels of boredom. The boredom group was not significantly different from the other three psychodrama groups on any measure of emotional feelings or behavioral states.

Overall, two groups were distinguished by the checklists. The first group can be called the anxiety-aggression group, comprised of Ss from both the anxiety and the aggression groups. The other group is the sexual arousal psychodrama group, which expressed the highest levels of sexual excitation and the least anxiety-aggression.

Physiological responses of psychodrama groups. Before carrying out the analysis on the physiological data, a number of scored intervals were combined to make up the medium and high emotion periods for the anxiety, sexual arousal, and boredom psychodramas. The nature of this combination is outlined in Table 1 (p. 25). T-tests were performed on the means of the periods which were combined to insure that no significant differences existed between them. The results of these t-tests are presented in Table 4. None of the periods being combined were significantly different from one another.

The analysis on the physiological data was performed to determine if the psychodrama movies produced different patterns of physiological responses. The results of the analysis are presented according to the separate dependent variables.

Table 4. T-values and significance levels for t-tests performed on physiological data which were combined within the medium and high emotion periods.

Group		Emotion level: Medium	Emotion level: High
Anxiety	SCR	t= .46 p > .10	t= .30 p > .10
	SCL	t= .83 p > .10	t= .02 p > .10
	HR	t= .23 p > .10	t= .25 p > .10
	SBP	t= .49 p > .10	t= .20 p > .10
	DBP	t= .95 p > .10	t= .35 p > .10
Sexual Arousal	SCR	t=1.22 p > .10	t= .84 p > .10
	SCL	t=1.59 p > .10	t= .84 p > .10
	HR	t= .23 p > .10	t= .26 p > .10
	SBP	t= .10 p > .10	t= .19 p > .10
	DBP	t= .33 p > .10	t= .83 p > .10

Table 4 (cont'd.)

Group		Emotion level	
		Medium(#4 & #5)	High(#6 & #7)
Boredom	SCR	t= .54 p > .10	t= .47 p > .10
	SCL	t=1.59 p > .10	t= .82 p > .10
	HR	t= .27 p > .10	t= .16 p > .10
	SBP	t= .10 p > .10	t= .19 p > .10
	DBP	t= .19 p > .10	t= .22 p > .10

Two significant findings came from the analysis of the skin conductance responses per minute, one in the middle and the other in the high emotion period of the psychodramas. The means for each psychodrama group in each experimental period are presented in Table 5. The Newman-Keuls test was used for a further analysis of the middle and high emotion periods. During the middle period, the anxiety group had the highest number of responses followed by the sexual arousal, aggression, and boredom groups. Both the anxiety and sexual arousal groups had a higher number of responses than the boredom group ($p < .05$). In the high emotion period, the aggression, sexual arousal, and anxiety groups all give a higher number of responses than the boredom group. The aggression group, which had the highest mean SCR rate,was significantly different from the boredom group, which had the lowest rate ($p < .01$). The sexual arousal and anxiety groups also gave a higher rate of response than the boredom group ($p < .05$), while they did not differ from the aggression group.

An inspection of the means in Table 5 shows that the anxiety, aggression, and sexual arousal groups gave a consistent number of responses across all experimental periods. The significant differences in the middle and high emotion periods were due to a decrease in the SCR rate in the boredom Ss.

Ss varied greatly on their initial skin conductance level and on the magnitude of change in SCL during the course of the experiment. The range in SCL was from 7.94 umhos to 306.92 umhos. The mean SCL for the entire experiment was 81.51 umhos, with a standard

Table 5. Means of the skin conductance response/minute in the pre-movie, movie and post-movie periods for the psychodrama groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	6.40	9.46	6.80	7.83	6.30	6.53
Sexual Arousal	6.93	8.80	7.13	7.46	6.73	7.60
Aggression	6.53	10.33	6.53	6.06	7.83	7.26
Boredom	5.20	7.33	5.93	3.93	3.16	5.26

Note.—Results from the MANOVA for the skin conductance response/minute is given by periods:
Pre-movie: $F(3,56)= .79$, $p > .05$.
First minute: $F(3,56)=1.24$, $p > .05$.
Low emotion: $F(3,56)= .22$, $p > .05$.
Middle emotion: $F(3,56)=3.45$, $p < .02$.
High emotion: $F(3,56)=5.54$, $p < .002$.
Post-movie: $F(3,56)=1.29$, $p > .05$.

deviation of 51.87 umhos. In order to capitalize on treatment effects, an attempt to reduce the error variance for Ss was carried out by transforming the raw SCL scores for each S into a range corrected score using the method outlined by Lykken (1973). The SCL transformed score ranges from zero to one, and takes into account the maximum and minimum SCL for each S during the experiment.

A 4 x 6 emotion (movie) x period analysis of variance was first performed on the uncorrected SCL data. Table 6 gives the results of this analysis. The main effect for periods and the periods x emotion interaction were both significant. The means for SCL are presented in Table 7. As can be seen from Figure 1, which graphically represents these means, all groups experienced an increase in SCL when the movie began. The levels of SC appear to remain relatively constant after the pre-movie period. Since the analysis of variance on SCL indicated a significant main effect for periods, and a periods x emotion interaction, a test on the simple main effects for periods and for movies within periods was performed (Winer, 1962). These results are presented below.

The test on periods indicated a simple main effect for periods in the anxiety group ($p < .001$), the sexual arousal group ($p < .01$), the aggression group ($p < .001$), and the boredom group ($p < .05$). A Newman-Keuls test was conducted on each group's means across periods. Every group showed a significant increase in SCL from the pre-movie to the first minute of the psychodrama ($p < .01$). None of the movie or post-movie periods were different from one another for any of the groups. Thus, the significant periods effect was due to the

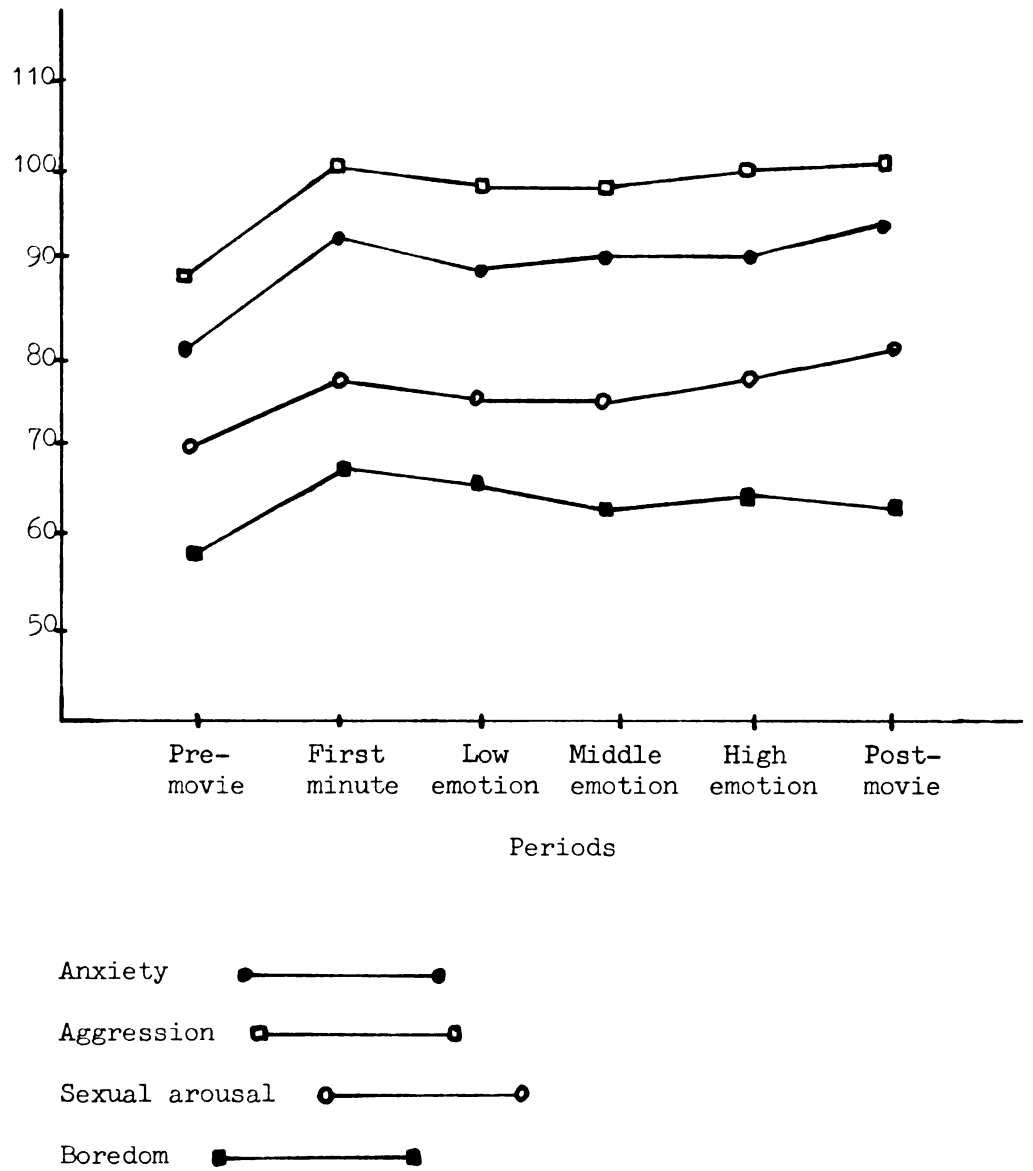
Table 6. Summary of the analysis of variance on skin conductance level as a function of psychodrama and periods

Source	SS	df	MS	F	p
Emotion (E)	9,377.17	3	3,125.75	1.23	n.s.
Error	141,873.13	56	2,533.45		
Periods (P)	2,899.93	5	579.99	65.46	<.001
P x E	418.81	15	27.92	3.15	<.001
Error	2,481.12	280	8.86		

Table 7. Means of the skin conductance level in the pre-movie, movie and post-movie periods for the psychodrama groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	80.00	91.92	89.80	90.06	91.88	96.76
Sexual Arousal	70.00	77.12	75.65	75.89	78.98	80.61
Aggression	88.82	100.74	99.88	98.48	100.38	100.84
Boredom	59.20	68.08	67.20	65.34	66.16	64.72

Figure 1. Means of skin conductance level for psychodrama groups by periods.



elevation in SCL from the pre-movie to the movie and post-movie level.

The test for simple effects of emotion within each period yielded no significant differences between groups. In spite of the significant emotion x periods interaction presented in Table 6, the lack of significant results in this test indicates that the influence of the movies on SCL was weak. Individual variation between subjects appears to override the influence of the movies.

In summary, the main effect for periods on SCL was due to an increase in SCL at the beginning of the movies which was sustained throughout the experiment. In spite of the significant emotion x periods interaction, the influence of the movies was too small to be isolated.

Since the main effect for emotion was not significant in the analysis of variance, the range-corrected scores were used in the multivariate analyses of variance. The range-corrected scores in these and subsequent analyses shall be referred to simply as SCL scores, and not as range-corrected scores. In the analyses for SCL, SCL maximum, SCL minimum and SCL maximum-minimum, no significant differences were found among psychodrama groups. (Means for the SCL measures are presented in Tables 8 through 11, Appendix E.)

The overall multivariate F reached significance for the heart rate analysis; however, none of the univariate tests performed on experimental periods showed any significant differences (See Table 12, Appendix E). The significant multivariate F, then, is due to an effect for experimental periods or an emotion x periods

interaction. A 4 x 6 analysis of variance was performed to make this clearer. Both a significant main effect for experimental periods ($p < .001$) and an interaction of emotion and periods ($p < .05$) were found (See Table 13).

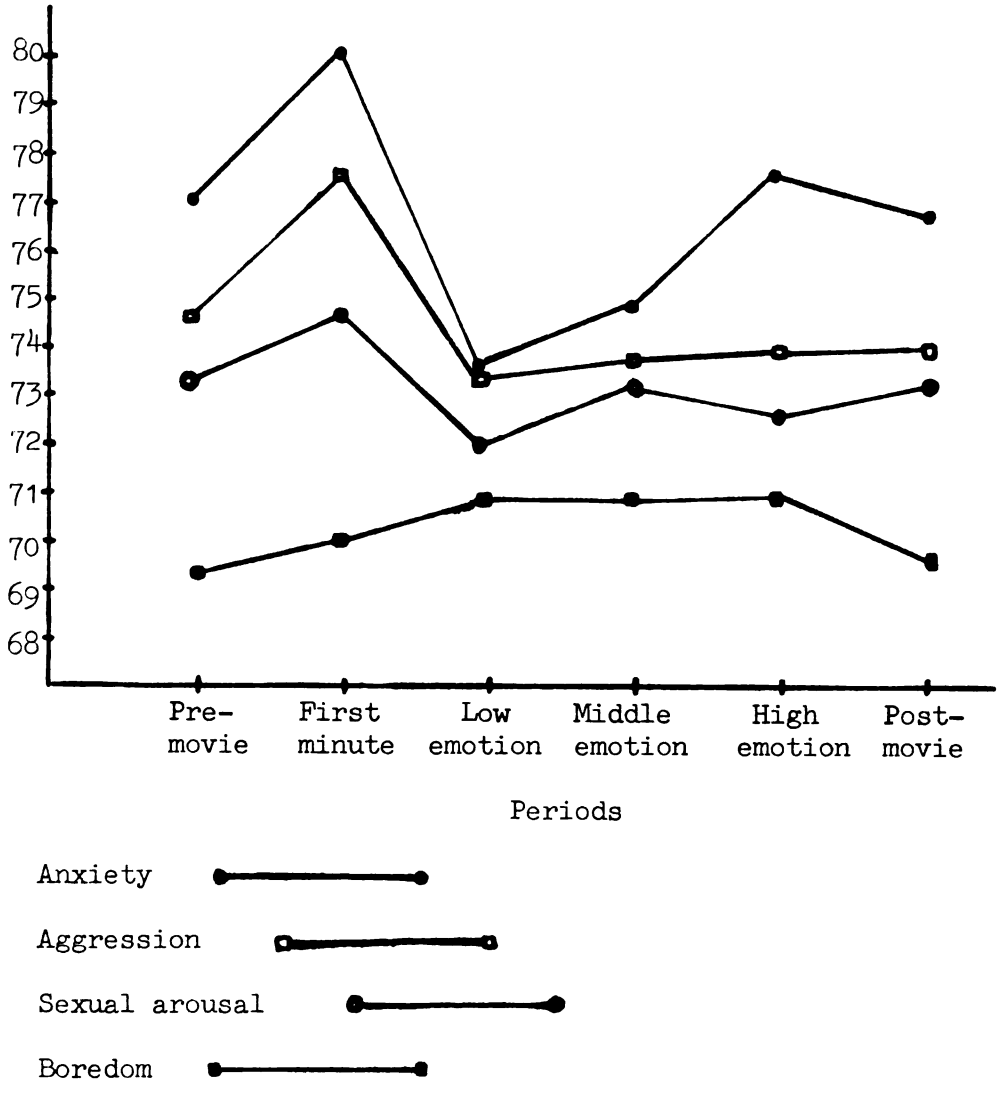
A test on the simple main effects for periods and for the emotion x period interaction was carried out according to the procedure outlined by Winer (1962, p.302). The test for periods indicated a significant effect for the anxiety group ($p < .01$) and for the aggression group ($p < .01$), while neither the sexual arousal group nor boredom group showed a significant effect for periods. A Newman-Keuls test for the difference among means was performed on the anxiety and aggression groups separately. No significant differences were found between period means in either group. A test for the simple main effects of emotion in each period also failed to yield any significant differences between psychodrama groups. Once again the effect of the movies was too small to isolate, since individual variation was so large.

When examining the graph on HR means (See Figure 2), the effect for periods appears to be accounted for by the initial increase in HR during the first minute of the movie in the anxiety and aggression groups. The anxiety group also shows an increase in HR during the high emotion period. The interaction effect between emotion and period appears to be due to changes in the anxiety and aggression groups while the sexual arousal and boredom groups show little variation. However, none of these differences reaches significance in the test for simple main effects.

Table 13. Summary of the analysis of variance on heart rate as a function of psychodrama and periods.

Source	SS	df	MS	F	p
Emotion (E)	1,857.03	3	619.01	.89	n.s.
Error	38,859.99	56	693.91		
Periods (P)	302.94	5	60.58	5.40	<.001
P x E	310.21	15	20.68	1.84	<.05
Error	3,137.00	280	11.20		

Figure 2. Means of heart rate for psychodrama groups by periods.



Second analysis. In the first analysis, the anxiety and aggression groups were found to be similar in giving the highest self-rated levels of anxiety and aggression. The sexual arousal group, in contrast, gave the lowest levels of anxiety and aggression while experiencing the highest levels of sexual arousal. In the present analysis, the anxiety and aggression groups are combined into one group, with n=30. This group is compared to the sexual arousal group on all physiological measures. The analysis tests for different physiological response patterns to accompany the distinct emotional experiences of the two groups.

A multivariate analysis of variance was carried out on the physiological measures as in the first analysis. None of the physiological measures were significantly different for these two groups. The means of all the physiological responses are presented in Tables 16 through 23 in Appendix E. In sum, the second analysis did not show any distinctive physiological patterns of response associated with Ss' subjective report of anxiety-aggression and sexual arousal.

Third analysis. When appraising their own feelings, a number of Ss rated themselves higher on an emotional experience which did not correspond to their psychodrama emotion. Therefore, Ss were regrouped according to their highest subjective emotional reaction. By recombining Ss in this manner, an attempt was made to make emotional groups more homogeneous. In the recombination, the aggression group had 12 Ss, the anxiety group had 20 Ss, the sexual arousal group had 6 Ss, and the boredom group had 11 Ss. 12 Ss were omitted

from the analysis, since they gave equally high ratings on two or more emotions and could not be confidently placed in any group. Table 24 gives several examples of Ss' original emotional self-ratings and their reassignment to new emotion groups.

Analysis of self-rated emotion. An analysis on the emotional self-ratings was performed in an attempt to find four distinctive emotional groups. The groups did not form four separate groups even though Ss in the new groups obtained the highest mean self-ratings for their respective emotions. Means are presented in Table 25. A Newman-Keuls comparison test was performed on each of the emotional self-ratings. Ss in the self-rated aggression group rated themselves significantly higher on aggression that did Ss in each of the other three self-rated emotion groups ($p < .01$). The sexual arousal Ss also rated themselves higher on sexual arousal than Ss in each of the other three groups ($p < .01$).

Unlike the aggression and sexual arousal groups, the anxiety and boredom emotion groups did not emerge as two clearly defined groups. The anxiety Ss gave the highest mean anxiety rating, but this was only marginally different ($p < .10$) from the lowest mean rating given by the boredom Ss. The rating of boredom showed a similar lack of differentiation. The boredom Ss gave the highest rating of boredom while the anxiety Ss gave the lowest rating, but these two groups differed only at the $p < .10$ level.

Analysis of physiological measures. An analysis of the physiological reactions of Ss combined according to their highest subjective experience was performed. No significant differences were found

Table 24. Assignment of subjects to highest self-rated emotional experience.

Psychodrama Group	Self-ratings				Reassignment
	Aggression	Anxiety	Sex-A	Boredom	
Boredom	6.0	4.5	1.0	2.0	Aggression
Boredom	1.5	5.0	3.0	4.0	Anxiety
Sexual Arousal	4.5	4.5	5.0	4.0	Sexual Arousal
Aggression	4.0	4.0	1.0	4.0	No Assignment

Table 25. Means of self-ratings on the Own Feelings checklist. Groups are defined by subject's highest self-rated emotion.

Group	Self-ratings			
	Aggression	Anxiety	Sexual Arousal	Boredom
Anxiety	2.47	4.42	1.67	1.92
Sexual Arousal	2.83	3.41	4.91	2.75
Aggression	5.16	3.58	1.83	2.33
Boredom	1.95	2.68	1.77	4.13

Note.—Results from the MANOVA for self-ratings on felt emotion:
Aggression: $F(3,45)=24.96$, $p < .0000$.
Anxiety: $F(3,45)=5.64$, $p < .0000$.
Sexual Arousal: $F(3,45)=34.40$, $p < .0000$.
Boredom: $F(3,45)=10.35$, $p < .0000$.

among the emotion groups on any physiological measure. The means for the physiological measures are presented in Tables 26 through 33 in Appendix E. Thus, the reassignment of Ss to subjective emotional groups also failed to produce any specific patterns of physiological activity associated with emotional experience.

Correlational analyses. Each of the previous three analyses was accompanied by a correlational analysis. Correlations were performed between all dependent measures. The overall pattern of results remained similar in each of these analyses. In general, the correlations were high on intra-physiological measures, often +.80 or +.90, while inter-physiological correlations, and correlations between physiological measures and verbal report were low, being in the range of +.10 or +.20. For example, the correlations of HR for the sexual arousal group recorded in the low emotion period correlated +.96 and +.94 with the HR recorded in the middle and high emotion periods. However, HR in the middle emotion period only correlated a -.14, -.22 and -.13 with SCL for the low, middle and high emotion periods of the movie. Similarly, HR in the middle and high emotion periods only correlated +.12 and +.16 with self-rated sexual arousal. Thus, the correlational analyses also failed to isolate any specific pattern of physiological response associated with any given emotional self-report.

DISCUSSION

The present study attempted to observe the physiological responses of subjects to the emotional experiences of aggression-anger, anxiety, sexual arousal, and boredom. The null hypothesis for this study stated: If the film stimuli elicited different emotional experiences as expressed by the subjects' verbal reports, then the peripheral physiological responses would be undifferentiated across the film stimuli. For this null hypothesis to be rejected, the film stimuli accompanied by differential verbal report would have to show differential physiological responses associated with the psychodrama vignettes. Three analyses were performed on the data. None of the psychodrama groups which gave differential verbal report was identified with a specific pattern of physiological response.

In the first analysis, the psychodrama vignettes did not produce four distinct emotional experiences. Two emotional experiences, however, did emerge from the subjects' verbal reports. The first of these was an anxiety-aggression emotion which both the anxiety and aggression Ss reported. The second, sexual excitation, was experienced by the sexual arousal Ss who reported higher levels of sexual arousal and the lowest levels of anxiety and aggression.

There were three significant findings in the first analysis of physiological variables, but none of these were associated with the

subjective report on the post-experimental questionnaire. The physiological variables were SCR/minute, SCL, and HR. The significant main effect for psychodramas in SCR rate was due to a decrease in responses in the boredom group during the middle and high periods of the movie while the other three emotion groups showed a stable level of response rate throughout the entire experiment. The decline in response rate shown by the boredom group cannot be attributed to the emotional experience of boredom per se since the four psychodrama groups did not differ in their self-ratings of boredom. The groups which did differ on the self-ratings of anxiety, aggression, and sexual arousal did not differ in their production of SCRs.

A significant periods effect was found for SCL. This effect resulted from an increase in SCL shown in all groups at the beginning of the movies. The increased level was maintained throughout the movie and the post-movie periods. The increase in SCL during the movie above that experienced during the pre-movie period appears to simply reflect the added stimulation given to the subjects during the movie presentation. There was also a movie x periods interaction for SCL. The full analyses of the SCL interaction failed to reveal any differences between the psychodrama groups. The movie effect was too small to isolate by statistical procedures or by examination of the graphed data.

HR also showed a significant periods effect and movie x periods interaction. An analysis on simple main effects failed to find any differences between periods and failed to isolate any movie effect

on periods. The reason for this lack in isolating the simple effects resulted from the large variance between subjects. The individual differences between Ss was much greater than the differences created by the experimental manipulation.

The second analysis of the physiological data combined the anxiety and aggression groups, and compared them to the sexual arousal group. The final analysis grouped subjects according to their own highest self-rated emotional experience. No significant findings emerged from these analyses. The lack of findings in the above analyses raises doubts as to the efficacy of the movies in eliciting any physiological responses from the subjects. The only sizeable main effect was a decrease in SCRs in the boredom group. Since the movies did not produce much of a physiological effect, it can be argued that this experiment was not a real test of the influence of emotions on peripheral physiology. However, as pointed out in the introduction, this is precisely the logic employed by those who take the peripheralist position whenever experimental findings do not show physiological differentiation among subjects who report differential emotional experiences.

Subjects in the present study reported experiencing the different emotions of anxiety-aggression to the anxiety and aggression psychodramas, and sexual arousal to the sexual psychodrama. These two emotional experiences were not accompanied by different physiological responses. Thus, the null hypothesis of no differences cannot be rejected and there is no support for the peripheralist interpretation of emotional experience. Unfortunately, even though no

support was found for the peripheralist position, no direct test can be made to support the activation position of emotions. There are, however, several facts from the data which do support Duffy's (1962) position on activation and emotion.

First, the energy expended and the direction of action in an emotional situation depends upon the individual's interpretation of the situation. According to Duffy, an emotional situation is unlikely to evoke an identical pattern of physiological responses from a group of subjects since every subject will have an idiosyncratic interpretation of the situation. The data from the post-experimental questionnaire indicated subjects did respond with idiosyncratic interpretations of the film stimuli. Most of the subjects reported feeling several different emotions during the psychodramas and a number of individuals reported their most intense emotion as one not portrayed as the main emotion of the psychodrama.

Secondly, for Duffy, the idiosyncratic interpretation of the emotional situation leads to idiosyncratic physiological responses by the persons evaluating the emotional situation. As indicated in the SCL and HR analyses, individual variation was much larger than the main effect attributed to the psychodrama.

Lastly, the only identifiable response pattern within the data interprets most economically in terms of activation theory. The decrease in SCR rate in the boredom group reflects the decline in stimulus intensity in the boredom film. In sum, although the present study does not directly test the arousal interpretation of emotional experience, the data from the study support the arousal

interpretation of physiological functioning within emotion.

Problems in the present study. A problem in the present study was a lack of a proper experimental atmosphere for a baseline recording of physiological functioning. Unlike some studies reported in the literature, which presented movies of mountains (Levi, 1965) or beach scenery (Averill, 1969), this experiment used a five-minute resting period without a pre-experimental movie. The high baseline readings obtained during this time suggest that a simple resting period was not sufficient to relieve subject anxiety or in the present context, the baseline period aroused subjects. The baseline readings during the pre-movie period were high. The means for SCL, SBP and DBP in this period were 81.51 umhos, 136.19 mm Hg, and 77.84 mm Hg, respectively.

Since the subjects in the present study started from a high physiological level before the movies began, there was little room for any observable change in physiological functioning except a decrease in activity over time. The physiological activity remained relatively stable throughout the experiment. Thus, very little information could be gained on the course of arousal to emotional stimuli. The mean blood pressure readings for the pre-movie period (and the rest of the experiment) were comparable to those obtained by Adamson et al. (1972) during the presentation of his sexual arousal and nauseating films.

The role of subject anxiety in producing a high baseline of physiological functioning is hard to establish. Certainly some anxiety was created by the attachment of electrodes and the blood

pressure cuff, since most subjects had no prior experience with psychophysiological research. The deceptive instructions might have also contributed to subject anxiety. Subjects were told that they would be viewing patients in psychotherapy and that they should judge the interaction of these patients. Most subjects had no familiarity with psychotherapy and were not sure what to expect from the individuals they would be watching. Furthermore, subjects were told that the psychotherapy tapes could be quite stressful and that they could withdraw from the study if they felt too upset by the tapes.

Lastly, even though the experimenter felt relaxed, he strongly desired that the subjects would believe the deceptive instructions. This desire might have been communicated to the subjects as experimenter anxiety, in turn making the subjects anxious about the experimental situation.

In conclusion, the present study measured the physiological and verbal responses of subjects who watched anxious, aggressive, sexual arousing and boring psychodrama vignettes. On a post-experimental questionnaire, two emotional groups emerged: an anxiety-aggression and a sexual arousal group. These emotional experiences were not differentiated by any physiological measure. Thus, a peripheralist interpretation of emotional experience was not supported. The data, on the other hand, tended to support an activation view of emotional experience. Activation theory, according to Duffy (1962), predicts that individual differences are much greater than uniform responses to emotional stimuli, and that

a decrease in stimulus intensity should be followed by a decrease in physiological arousal. Both of these predictions received partial support. The major problem encountered in the present study was in a high baseline of physiological activity in the subjects, leaving little room for them to respond to the movie stimuli.

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APPENDICES

APPENDIX A

List of Physiological Abbreviations

ANS	autonomic nervous system
AP	acid phosphatase
BP	blood pressure
CNS	central nervous system
DBP	diastolic blood pressure
E	epinephrine
EEG	electroencephalogram
EMG	electromyogram
EOG	electroculargram
GSR	galvanic skin response
HR	heart rate
LPC	log palmar conductance
MT	muscle tension
NE	norepinephrine
PNS	parasympathetic nervous system
17-OHCS	17-hydroxycorticosteroids
RI	respiration irregularity
RR	respiration rate
SBP	systolic blood pressure
SC	skin conductance
SCL	skin conductance level

SCR	skin conductance response
SNS	sympathetic nervous system
SR	skin resistance

APPENDIX B

Psychodrama Interaction Assessment Project

Adjective Checklist for Student Evaluators

Instructions: Indicate the extent to which Character 1 (_____) experienced the states listed below by circling the appropriate number. "1" indicates "not at all," a "4" indicates "moderately" and "7" indicates "extremely."

For example, if the state were "surprised" and Character 1 was moderately surprised, you would circle the "4" as indicated below.

1 2 3 4 5 6 7

not at all — mod. — extremely

In the same manner, indicate the extent to which Character 2 (_____) experienced the states listed below.

Character 1								Character 2							
affectionate	1	2	3	4	5	6	7	affectionate	1	2	3	4	5	6	7
aggressive	1	2	3	4	5	6	7	aggressive	1	2	3	4	5	6	7
amused	1	2	3	4	5	6	7	amused	1	2	3	4	5	6	7
angry	1	2	3	4	5	6	7	angry	1	2	3	4	5	6	7
anxious	1	2	3	4	5	6	7	anxious	1	2	3	4	5	6	7
apathetic	1	2	3	4	5	6	7	apathetic	1	2	3	4	5	6	7
bored	1	2	3	4	5	6	7	bored	1	2	3	4	5	6	7
delighted	1	2	3	4	5	6	7	delighted	1	2	3	4	5	6	7
disgusted	1	2	3	4	5	6	7	disgusted	1	2	3	4	5	6	7
elated	1	2	3	4	5	6	7	elated	1	2	3	4	5	6	7
embarrassed	1	2	3	4	5	6	7	embarrassed	1	2	3	4	5	6	7
enraged	1	2	3	4	5	6	7	enraged	1	2	3	4	5	6	7
envious	1	2	3	4	5	6	7	envious	1	2	3	4	5	6	7

1 2 3 4 5 6 7

not at all — mod. — extremely

Character 1								Character 2							
fearful	1	2	3	4	5	6	7	fearful	1	2	3	4	5	6	7
guilty	1	2	3	4	5	6	7	guilty	1	2	3	4	5	6	7
hostile	1	2	3	4	5	6	7	hostile	1	2	3	4	5	6	7
hungry	1	2	3	4	5	6	7	hungry	1	2	3	4	5	6	7
indifferent	1	2	3	4	5	6	7	indifferent	1	2	3	4	5	6	7
jealous	1	2	3	4	5	6	7	jealous	1	2	3	4	5	6	7
lighthearted	1	2	3	4	5	6	7	lighthearted	1	2	3	4	5	6	7
nauseous	1	2	3	4	5	6	7	nauseous	1	2	3	4	5	6	7
nervous	1	2	3	4	5	6	7	nervous	1	2	3	4	5	6	7
resentful	1	2	3	4	5	6	7	resentful	1	2	3	4	5	6	7
sexually aroused	1	2	3	4	5	6	7	sexually aroused	1	2	3	4	5	6	7
shameful	1	2	3	4	5	6	7	shameful	1	2	3	4	5	6	7
sleepy	1	2	3	4	5	6	7	sleepy	1	2	3	4	5	6	7
tense	1	2	3	4	5	6	7	tense	1	2	3	4	5	6	7
terrified	1	2	3	4	5	6	7	terrified	1	2	3	4	5	6	7
thirsty	1	2	3	4	5	6	7	thirsty	1	2	3	4	5	6	7
tired	1	2	3	4	5	6	7	tired	1	2	3	4	5	6	7

The following section has a slightly different procedure. In order to provide a more thorough understanding of the clinical evaluation process, we would like you to indicate how you felt while watching the psychodrama. It is important for you to give as candid and accurate a report of your feelings as you can.

Use the scales in the same manner as before, with the exception of reporting your own feelings.

Own Feelings Checklist

affectionate	1	2	3	4	5	6	7	hostile	1	2	3	4	5	6	7
aggressive	1	2	3	4	5	6	7	hungry	1	2	3	4	5	6	7
amused	1	2	3	4	5	6	7	indifferent	1	2	3	4	5	6	7
angry	1	2	3	4	5	6	7	jealous	1	2	3	4	5	6	7
anxious	1	2	3	4	5	6	7	lighthearted	1	2	3	4	5	6	7
apathetic	1	2	3	4	5	6	7	nauseous	1	2	3	4	5	6	7
bored	1	2	3	4	5	6	7	nervous	1	2	3	4	5	6	7
delighted	1	2	3	4	5	6	7	resentful	1	2	3	4	5	6	7
disgusted	1	2	3	4	5	6	7	sexually aroused	1	2	3	4	5	6	7
elated	1	2	3	4	5	6	7	shameful	1	2	3	4	5	6	7
embarrassed	1	2	3	4	5	6	7	sleepy	1	2	3	4	5	6	7
enraged	1	2	3	4	5	6	7	tense	1	2	3	4	5	6	7
envious	1	2	3	4	5	6	7	terrified	1	2	3	4	5	6	7
fearful	1	2	3	4	5	6	7	thirsty	1	2	3	4	5	6	7
guilty	1	2	3	4	5	6	7	tired	1	2	3	4	5	6	7

1 2 3 4 5 6 7

not at all mod. extremely

Behavioral Checklist

It is also important to examine the extent to which behavioral states are related to a person's observations and evaluations. Therefore, we are asking you to describe other reactions you may have had while watching the drama.

To what extent did you experience any of the following behaviors? Answer by circling the appropriate number. "1" means "not at all," and "5" indicates "to a great extent."

Did you at any time experience any of the following behaviors?

banging the table	1	2	3	4	5
"butterflies in the stomach"	1	2	3	4	5
crying	1	2	3	4	5
erection	1	2	3	4	5
hiding your eyes	1	2	3	4	5
hunger pangs	1	2	3	4	5
impulse to run	1	2	3	4	5
increased heart rate	1	2	3	4	5
laughter	1	2	3	4	5
making a fist	1	2	3	4	5
nausea (vomiting)	1	2	3	4	5
sweating palms	1	2	3	4	5
verbal exclamations (Look out! Help! Run! Oh!)	1	2	3	4	5

1 2 3 4 5

not at all — medium — to a great extent

In order to judge the usefulness of nontrained subjects in evaluating psychotherapy, it is necessary to assess the effect of the psychodrama on the observer. The following questions are designed to give us maximum amount of information about your reactions. Please answer as completely as possible.

1. How do you feel after watching the psychodrama?

2. What was the nature of Person 1's problem?

3. What was the nature of Person 2's problem?

4. Were you able to become involved in the psychodrama?

5. What is your interpretation of what happened in the psychodrama?

6. Were both people self-controlled at all times?

7. Did you have any particular reactions to the events in the drama? What were they? Be as specific as possible.

8. Were the people you saw real?

9. What was the purpose of the study?

10. Did you believe what you were told all the way through? If not, when did you begin to change your mind about the nature of the study?

11. Did this questionnaire change any of your thoughts or opinions about the nature of the study? If so, explain.

12. Give a one or two word description of how you feel at the present time.

Please list any additional comments below, and on the other side of the page, if necessary.

APPENDIX C

Debriefing Procedure

In the present study, subjects are told that they will act as raters of patients in psychodrama therapy. As raters, their job is to examine the affect which the patients express and make decisions about the personalities and problems of the patients. However, the psychodramas have been staged and the individuals appearing in the dramas are actors. This deception attempts to make the dramas life-like and to elicit reactions from the subjects which might be given to real as opposed to actor personalities. The deception procedure is also used to involve the subjects in the psychodramas and to lessen the anxiety they may feel about being monitored by the experimenter. As Barclay (1971) demonstrated, physiological responses to emotional stimuli can be enhanced or masked if the subjects are aware of the true nature of a study seeking to monitor physiological reactions to emotional stimuli. (Also, see Kling, Borowitz and Cartwright, 1972; Hovland, Lumsdaine and Sheffield, 1949.)

In trying to protect subjects from any psychological harm which could be experienced while viewing the film stimuli, each subject will be informed that he may leave the experiment at any time without penalty. When the experiment is terminated, the subject will be given an explanation of the purpose of the study and the use of the deception. Subjects will be encouraged to express their feelings

about the study. Any questions which they may have will be answered as fully as possible. In a final step to debrief the subject, each subject will be sent a short letter which contains a summary of the results of the experiment. Information will be included in this letter telling each subject where the experimenter can be reached if he has any further questions or feelings he may wish to express.

A detailed account of the statements to be made during debriefing is as follows:

> I am interested in what physiological responses might accompany various emotional states. During this experiment, you were shown a videotape of two individuals who were (folding airplanes, having an argument in which racial comments were made, having a fistfight, were kissing one another). The tape you saw was actually a filmed production and the individuals in the tape were not patients, but actors. There are four other tapes which I use in this experiment. These are. . .(description of the three vignettes not shown any given subject).
>
> You were told that these people were patients in therapy to encourage you to become more involved in the action of the film and less concerned about being monitored here in the laboratory. Past research has shown that if subjects are anxious about being monitored by the experimenter in studies using emotional films the physiological reactions they have differ from when they are not anxious. By telling you that the people you saw were patients, I hope that you were more at ease and that you could feel the emotions which the persons in the film were portraying. Do you have any questions? What do you think about the experiment? Before you go, could you tell me what the experiment was about?
>
> I would like to thank you for participating in my study. In several months, I will have the results of the study and would like to send you a summary of them. If you will sign this list, and give me your address for the Fall term, I will send the results to you.
>
> If you have any further questions about the study or if you would like to talk some more about the experiment, I have an

office in Olds Hall. If you would like to talk to any faculty members about the study, you may go to Dr. Fitzgerald or to Dr. Barclay, both of whom are familiar with my study. Their offices are in Baker Hall. Lastly, I would ask that you please do not discuss the experiment with the other individuals in your class, since prior knowledge of the study may change the results I obtain.

APPENDIX D

Instructions to Subjects

The experiment in which you are participating is studying the possible relationship between psychological and physiological stress. Individuals who have worked in the field of mental health report that viewing and rating patients in therapy can be very stressful. In an attempt to study the stresses which therapeutic raters undergo, I will show you a videotape of patients in psychodrama therapy. After watching the videotape, you will be given a sheet on which to place your ratings of the patients.

As a rater, it is important for you to become involved as much as possible with the people in the therapy session. Past research has shown that the best ratings of patients are done if the rater attempts to feel what each patient is feeling. Ask yourself some questions about the individuals in the videotape session. What are these individuals like? What emotional problems might they have?

In the tape, you will see a therapist has asked two clients to come to a psychodrama session. The patients knew they were being taped, and they have given permission to use these tapes for research purposes.

Some tapes can be quite stressful. If for any reason you feel that you would not like to continue in the experiment, you may withdraw now or anytime during the videotape without any loss

of credit. Are there any questions?

Again, I would like to encourage you to become involved as much as you can with the feelings and personalities of the people you are watching.

APPENDIX E

Tables

Table 8. Means of the SCL in the pre-movie, movie and post-movie periods for the psychodrama groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.21	.53	.49	.47	.44	.57
Sexual Arousal	.26	.53	.46	.48	.43	.54
Aggression	.20	.50	.54	.47	.54	.61
Boredom	.31	.62	.54	.42	.37	.49

Note.—Results from the MANOVA for SCLare given by periods:
Pre-movie: $F(3,56)= .65$, $p > .05$.
First minute: $F(3,56)= .79$, $p > .05$.
Low emotion: $F(3,56)= .49$, $p > .05$.
Middle emotion: $F(3,56)= .35$, $p > .05$.
High emotion: $F(3,56)=1.52$, $p > .05$.
Post-movie: $F(3,56)= .46$, $p > .05$.

Table 9. Means of SCLmax in the pre-movie, movie, and post-movie periods for the psychodrama groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.26	.61	.55	.57	.51	.66
Sexual Arousal	.35	.63	.56	.56	.53	.64
Aggression	.29	.65	.57	.52	.64	.67
Boredom	.36	.71	.61	.48	.41	.55

Note.—Results from the MANOVA for SCLmax are given by periods:
Pre-movie: $F(3,56)= .66$, $p > .05$.
First minute: $F(3,56)= .52$, $p > .05$.
Low emotion: $F(3,56)= .31$, $p > .05$.
Middle emotion: $F(3,56)= .78$, $p > .05$.
High emotion: $F(3,56)=2.58$, $p < .06$.
Post-movie: $F(3,56)= .53$, $p > .05$.

Table 10. Means of SCLmin in the pre-movie, movie and post-movie periods for the psychodrama groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.17	.47	.46	.43	.39	.51
Sexual Arousal	.20	.47	.41	.42	.38	.47
Aggression	.16	.48	.40	.41	.48	.52
Boredom	.27	.57	.50	.40	.32	.45

Note.—Results from the MANOVA for SCLmin are given by periods:
Pre-movie: $F(3,56)= .69$, $p > .05$.
First minute: $F(3,56)=1.03$, $p > .05$.
Low emotion: $F(3,56)=1.07$, $p > .05$.
Middle emotion: $F(3,56)= .05$, $p > .05$.
High emotion: $F(3,56)=1.28$, $p > .05$.
Post-movie: $F(3,56)= .19$, $p > .05$.

Table 11. Means of SCL max-min in the pre-movie, movie and post-movie periods for the psychodrama groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.08	.14	.08	.14	.11	.15
Sexual Arousal	.14	.15	.15	.13	.15	.17
Aggression	.12	.16	.17	.10	.16	.15
Boredom	.09	.13	.11	.08	.09	.09

Note.—Results from the MANOVA for the SCL max-min are given by periods:
Pre-movie: $F(3,56)=1.16$, $p > .05$.
First minute: $F(3,56)= .23$, $p > .05$.
Low emotion: $F(3,56)=1.48$, $p > .05$.
Middle emotion: $F(3,56)=1.35$, $p > .05$.
High emotion: $F(3,56)=1.73$, $p > .05$.
Post-movie: $F(3,56)=1.15$, $p > .05$.

Table 12. Means of HR in the pre-movie, movie and post-movie periods for the psychodrama groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	77.20	79.86	73.86	75.40	77.73	76.60
Sexual Arousal	73.20	74.53	72.13	73.40	72.60	73.46
Aggression	75.73	77.86	73.73	74.13	74.66	74.66
Boredom	69.06	70.80	71.33	71.20	71.80	69.86

Note.—Results from the MANOVA for HR are given by periods:
Pre-movie: $F(3,56)=1.33$, $p > .05$.
First minute: $F(3,56)=1.74$, $p > .05$.
Low emotion: $F(3,56)= .19$, $p > .05$.
Middle emotion: $F(3,56)= .39$, $p > .05$.
High emotion: $F(3,56)= .93$, $p > .05$.
Post-movie: $F(3,56)= .98$, $p > .05$.

Table 14. Means of SBP in the pre-movie, movie and post-movie periods for the psychodrama groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	132.68	138.64	137.81	138.49	135.22	136.29
Sexual Arousal	136.78	138.28	139.60	138.52	138.34	136.44
Aggression	137.79	141.96	139.49	140.80	138.72	137.29
Boredom	137.49	139.12	138.21	135.80	135.00	132.92

Note.—Results from the MANOVA for SBP are given by periods:
Pre-movie: $F(3,56) = .41$, $p > .05$.
First minute: $F(3,56) = .24$, $p > .05$.
Low emotion: $F(3,56) = .06$, $p > .05$.
Middle emotion: $F(3,56) = .33$, $p > .05$.
High emotion: $F(3,56) = .35$, $p > .05$.
Post-movie: $F(3,56) = .31$, $p > .05$.

Table 15. Means of DBP in the pre-movie, movie and post-movie periods for the psychodrama groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	77.91	81.68	81.79	81.34	81.28	81.21
Sexual Arousal	76.68	77.58	78.49	78.72	77.68	77.65
Aggression	77.71	82.05	80.27	79.75	81.08	79.42
Boredom	79.05	80.88	80.14	80.35	80.84	79.22

Note.—Results from the MANOVA for DBP are given by periods:
Pre-movie: $F(3,56)= .11$, $p > .05$.
First minute: $F(3,56)= .65$, $p > .05$.
Low emotion: $F(3,56)= .24$, $p > .05$.
Middle emotion: $F(3,56)= .18$, $p > .05$.
High emotion: $F(3,56)= .45$, $p > .05$.
Post-movie: $F(3,56)= .28$, $p > .05$.

Table 16. Means of SCR/minute in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Groups	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	6.46	9.90	6.66	6.95	7.06	6.90
Sexual Arousal	6.93	8.80	7.13	7.46	6.73	7.60

Note.—Results from the MANOVA for SCR/minute are given by periods:
Pre-movie: $F(1,43)= .19$, $p > .05$.
First minute: $F(1,43)= .58$, $p > .05$.
Low emotion: $F(1,43)= .12$, $p > .05$.
Middle emotion: $F(1,43)= .16$, $p > .05$.
High emotion: $F(1,43)= .08$, $p > .05$.
Post-movie: $F(1,43)= .40$, $p > .05$.

Table 17. Means of the SCL in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	.20	.54	.49	.47	.49	.59
Sexual Arousal	.26	.53	.46	.48	.43	.54

Note.—Results from the MANOVA for SCL are given by periods:
Pre-movie: $F(1,43)= .52$, $p > .05$.
First minute: $F(1,43)= .01$, $p > .05$.
Low emotion: $F(1,43)= .24$, $p > .05$.
Middle emotion: $F(1,43)= .04$, $p > .05$.
High emotion: $F(1,43)= .74$, $p > .05$.
Post-movie: $F(1,43)= .25$, $p > .05$.

Table 18. Means of the SCLmax in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	.27	.63	.56	.54	.57	.67
Sexual Arousal	.35	.63	.56	.56	.53	.64

Note.—Results from the MANOVA for SCLmax are given by periods:
Pre-movie: $F(1,43)=1.11$, $p > .05$.
First minute: $F(1,43)= .004$, $p > .05$.
Low emotion: $F(1,43)= .000$, $p > .05$.
Middle emotion: $F(1,43)= .12$, $p > .05$.
High emotion: $F(1,43)= .25$, $p > .05$.
Post-movie: $F(1,43)= .09$, $p > .05$.

Table 19. Means of the SCLmin in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	.16	.48	.43	.42	.44	.51
Sexual Arousal	.20	.47	.41	.42	.38	.47

Note.—Results from the MANOVA for SCLmin are given by periods:
Pre-movie: $F(1,43)= .29$, $p > .05$.
First minute: $F(1,43)= .01$, $p > .05$.
Low emotion: $F(1,43)= .17$, $p > .05$.
Middle emotion: $F(1,43)= .0006$, $p > .05$.
High emotion: $F(1,43)= .48$, $p > .05$.
Post-movie: $F(1,43)= .28$, $p > .05$.

Table 20. Means of the SCL max-min in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	.10	.15	.13	.12	.13	.15
Sexual Arousal	.14	.15	.15	.13	.15	.17

Note.—Results from the MANOVA for SCL max-min are given by periods:
Pre-movie: $F(1,43)=1.17$, $p > .05$.
First minute: $F(1,43)= .03$, $p > .05$.
Low emotion: $F(1,43)= .34$, $p > .05$.
Middle emotion: $F(1,43)= .29$, $p > .05$.
High emotion: $F(1,43)= .19$, $p > .05$.
Post-movie: $F(1,43)= .27$, $p > .05$.

Table 21. Means of the HR in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	76.46	78.86	73.80	74.76	76.20	75.63
Sexual Arousal	76.68	77.58	78.49	78.72	77.68	77.65

Note.—Results from the MANOVA for HR are given by periods:
Pre-movie: $F(1,43)= .83$, $p > .05$.
First minute: $F(1,43)=1.50$, $p > .05$.
Low emotion: $F(1,43)= .24$, $p > .05$.
Middle emotion: $F(1,43)= .15$, $p > .05$.
High emotion: $F(1,43)=1.17$, $p > .05$.
Post-movie: $F(1,43)= .39$, $p > .05$.

Table 22. Means of the SBP in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	135.24	140.30	138.65	139.64	136.97	136.78
Sexual Arousal	136.78	138.28	139.60	138.52	138.23	136.44

Note.—Results from the MANOVA for SBP are given by periods:
Pre-movie: $F(1,43)= .13$, $p > .05$.
First minute: $F(1,43)= .27$, $p > .05$.
Low emotion: $F(1,43)= .05$, $p > .05$.
Middle emotion: $F(1,43)= .07$, $p > .05$.
High emotion: $F(1,43)= .12$, $p > .05$.
Post-movie: $F(1,43)$ .008, $p > .05$.

Table 23. Means of the DBP in the pre-movie, movie and post-movie periods for the anxiety-aggression and sexual arousal groups.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety-Aggression	77.81	81.87	81.03	80.54	81.18	80.31
Sexual Arousal	76.68	77.58	78.49	78.72	77.68	77.65

Note.—Results from the MANOVA for DBP are given by periods:
Pre-movie: $F(1,43)= .12$, $p > .05$.
First minute: $F(1,43)=1.92$, $p > .05$.
Low emotion: $F(1,43)= .57$, $p > .05$.
Middle emotion: $F(1,43)= .38$, $p > .05$.
High emotion: $F(1,43)=1.38$, $p > .05$.
Post-movie: $F(1,43)= .79$, $p > .37$.

Table 26. Means of SCL/minute in the pre-movie, movie and post-movie periods for groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	5.50	8.41	6.41	5.45	5.79	6.66
Aggression	6.59	11.40	7.65	7.15	6.60	7.20
Sexual Arousal	7.50	8.83	6.16	7.08	5.83	7.00
Boredom	5.45	6.81	5.54	5.40	5.18	5.81

Note.—Results from the MANOVA for SCL/minute are given by periods:
Pre-movie: $F(3,45)= .95$, $p > .05$.
First minute: $F(3,45)=3.01$, $p < .03$.
Low emotion: $F(3,45)= .76$, $p > .05$.
Middle emotion: $F(3,45)= .72$, $p > .05$.
High emotion: $F(3,45)= .35$, $p > .05$.
Post-movie: $F(3,45) .36$, $p > .05$.

Table 27. Means of SCL in the pre-movie, movie and post-movie periods for groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.23	.51	.48	.46	.46	.62
Sexual Arousal	.21	.58	.50	.45	.45	.56
Aggression	.39	.60	.46	.46	.29	.45
Boredom	.21	.55	.56	.54	.55	.60

Note.—Results from the MANOVA for SCL are given by periods:
Pre-movie: $F(3,45)= .97$, $p > .05$.
First minute: $F(3,45)= .42$, $p > .05$.
Low emotion: $F(3,45)= .65$, $p > .05$.
Middle emotion: $F(3,45)= .79$, $p > .05$.
High emotion: $F(3,45)=1.77$, $p > .05$.
Post-movie: $F(3,45)= .59$, $p > .05$.

Table 28. Means of the SCLmax in the pre-movie, movie and post-movie periods for the groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.31	.59	.58	.51	.53	.68
Sexual Arousal	.28	.68	.56	.53	.52	.65
Aggression	.48	.73	.59	.55	.42	.58
Boredom	.26	.63	.62	.60	.62	.64

Note.—Results from the MANOVA for SCLmax are given by periods:
Pre-movie: $F(3,45)=1.34$, $p > .05$.
First minute: $F(3,45)= .68$, $p > .05$.
Low emotion: $F(3,45)= .28$, $p > .05$.
Middle emotion: $F(3,45)= .66$, $p > .05$.
High emotion: $F(3,45)= .84$, $p > .05$.
Post-movie: $F(3,45)= .16$, $p > .05$.

Table 29. Means of the SCLmin in the pre-movie, movie and post-movie periods for the groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.21	.46	.42	.43	.41	.55
Sexual Arousal	.17	.52	.44	.41	.40	.50
Aggression	.32	.54	.38	.39	.23	.38
Boredom	.17	.49	.51	.48	.51	.56

Note.—Results from the MANOVA for SCLmin are given by periods:
Pre-movie: $F(3,45)= .52$, $p > .05$.
First minute: $F(3,45)= .34$, $p > .05$.
Low emotion: $F(3,45)= .91$, $p > .05$.
Middle emotion: $F(3,45)= .54$, $p > .05$.
High emotion: $F(3,45)=2.15$, $p > .05$
Post-movie: $F(3,45)= .66$, $p > .05$.

Table 30. Means of the SCL max-min in the pre-movie, movie, and post-movie periods for the groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	.10	.13	.15	.07	.11	.13
Sexual Arousal	.10	.15	.11	.11	.12	.14
Aggression	.16	.17	.20	.16	.19	.19
Boredom	.08	.14	.10	.11	.10	.07

Note.—Results from the MANOVA for SCL max-min are given by periods:
Pre-movie: $F(3,45)=1.20$, $p > .05$.
First minute: $F(3,45)= .32$, $p > .05$.
Low emotion: $F(3,45)=1.10$, $p > .05$.
Middle emotion: $F(3,45)=1.97$, $p > .05$.
High emotion: $F(3,45)=1.60$, $p > .05$.
Post-movie: $F(3,45)=2.22$, $p > .05$.

Table 31. Means of the HR in the pre-movie, movie and post-movie periods for the groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	77.83	79.66	75.83	75.75	76.83	76.33
Sexual Arousal	74.50	78.00	72.90	74.50	76.10	74.05
Aggression	73.66	73.00	73.33	74.16	73.50	74.66
Boredom	68.54	70.36	68.90	69.90	70.00	67.81

Note.—Results from the MANOVA for HR are given by periods:
Pre-movie: $F(3,45)=1.14$, $p > .05$.
First minute: $F(3,45)=1.77$, $p > .05$.
Low emotion: $F(3,45)= .88$, $p > .05$.
Middle emotion: $F(3,45)= .69$, $p > .05$.
High emotion: $F(3,45)=1.11$, $p > .05$.
Post-movie: $F(3,45)=1.33$, $p > .05$.

Table 32. Means of the SBP in the pre-movie, movie and post-movie periods for the groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	132.80	137.37	137.15	137.25	134.51	136.22
Sexual Arousal	138.37	142.96	139.40	140.44	138.78	137.54
Aggression	142.40	141.80	140.55	140.03	141.65	139.65
Boredom	131.43	134.42	135.42	134.66	133.36	129.70

Note.—Results from the MANOVA for SBP are given by periods:
Pre-movie: $F(3,45)=1.21$, $p > .05$.
First minute: $F(3,45)=1.22$, $p > .05$.
Low emotion: $F(3,45)= .26$, $p > .05$.
Middle emotion: $F(3,45)= .45$, $p > .05$.
High emotion: $F(3,45)= .84$, $p > .05$.
Post-movie: $F(3,45)=1.01$, $p > .05$.

Table 33. Means of the DBP in the pre-movie, movie and post-movie periods for the groups formed by self-ratings.

Group	Periods					
	Pre-movie	First minute	Low emotion	Middle emotion	High emotion	Post-movie
Anxiety	77.15	79.60	80.26	79.47	79.54	77.80
Sexual Arousal	80.80	83.57	81.12	80.49	81.76	81.38
Aggression	80.05	80.05	80.96	82.96	80.90	83.45
Boredom	72.22	77.50	78.64	79.09	79.41	76.58

Note.—Results from the MANOVA for DBP are given by periods:
Pre-movie: $F(3,45)=1.64$, $p > .05$.
First minute: $F(3,45)=1.21$, $p > .05$.
Low emotion: $F(3,45)= .14$, $p > .05$.
Middle emotion: $F(3,45)= .25$, $p > .05$.
High emotion: $F(3,45)= .19$, $p > .05$.
Post-movie: $F(3,45)= .99$, $p > .05$.