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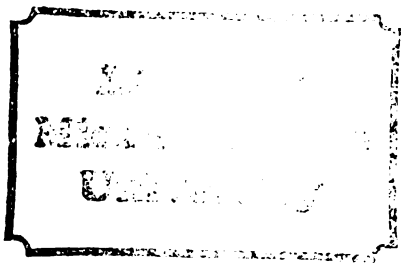

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The Effect of An Interpersonal Process Recall (IPR) Videotape and Operating Room Treatment Program on Medical Student Learning, Emotional/Physiological Reactions, and Attitudes in Early Surgical Training: An Experimental Study

presented by

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The Effect of An Interpersonal Process Recall (IPR) Videotape and Operating Room Treatment Program on Medical Student Learning, Emotional/Physiological Reactions, and Attitudes in Early Surgical Training: An Experimental Study

By

Russell Edward Hogan

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ABSTRACT

The Effect of An Interpersonal Process Recall (IPR) Videotape and Operating Room Treatment Program on Medical Student Learning, Emotional/Physiological Reactions, and Attitudes in Early Surgical Training: An Experimental Study

By

Russell Edward Hogan

The incidence of medical students' adverse reactions to common surgical stimuli was documented by Coppola and Cochran. One-third of these students (n= 106), surveyed during their surgical clerkships, reported apprehension about observing and assisting in surgical procedures. The present study attempted to investigate the effect of a treatment program on these adverse reactions and on medical students' learning, attitudes, and career preference.

Forty-five first and second year students from the Colleges of Human and Osteopathic Medicine at Michigan State University participated in the study. A three-group posttest-only control group design was used. Group One received two Interpersonal Process Recall (IPR) laboratory

sessions. These students were then videotaped while observing an operation, watched the videotape, and discussed their reactions. Group Two students observed one operation. Group Three received no treatment. All students observed an operation and completed eight instruments measuring emotional-physiological reactivity, learning, attitudes toward themselves and surgeons, career preference, and impressions of the operating room experience.

Analysis of variance and chi-square analysis indicated no significant differences among the groups. The results of chi-square analysis of the career preference measure approached significance, suggesting a more positive attitude toward aurgery on the part of Group One students. Sample size, however, required cautious interpretation of this result.

Medical student interest in surgical experiences early in medical school was discussed. The collaboration of psychology and medicine in this surgical education study was emphasized.

Dedicated
to
my family,
especially my mother,
who gave to me and showed me
many ways of being

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CHAPTER I

THE PROBLEM

Introduction

This study was an investigation of the relationship among physiological-emotional responses, learning, and attitudes of first and second year medical students just prior to their surgical clerkships. The investigation was an exploratory experimental study evaluating the effectiveness of an Interpersonal Process Recall (IPR) (Kagan, 1975, 1979) pre-surgical clerkship experience. The purpose of the treatment was to increase learning and decrease the negative impact of common operating room stimuli on medical students in their early surgical training.

This chapter includes a discussion of the events leading to the explication of the incidence of the problem, the need for the study, the theoretical framework in which the problem was conceptualized, a brief description of the treatment approach, definition of terms, assumptions employed in the study, and a general statement of the research questions.

Incidence Of The Problem

Through discussions with students before, during, and after the students' participation in the surgical clerkship, Coppola and Cochran (1979) noted that some students tended to be frightened by or apprehensive about observing, assisting in, or performing surgical procedures. Coppola and Cochran reasoned that, depending upon the actual incidence of such reactions in medical students, these reactions might have significant effects in two areas: 1) the medical student's attention to the learning of necessary information and skills involved in surgery and 2) the student's viewpoint toward and possible consideration of surgery as a career specialty. Coppola and Cochran's specific concerns were that students' apprehension about surgery might detract from their learning in the operating room, contribute to a relatively negative attitude toward surgery and/or surgeons, and perhaps dissuade some students from considering surgery as a career specialty. The latter concerns related to issues of medical student self-perception and attitudes about surgery and surgeons, and the influence of these factors on career selection. If some students perceived themselves as overly reactive to common surgical stimuli and judged that this over-reactivity was unchangeable or maladaptive in terms of consideration of surgery as a career specialty, then these students might rule out surgery as a career option. Stated another way, if some medical students held a stereotypical view of surgeons

as insensitive to surgical stimuli, and if these students saw themselves as highly sensitive to these stimuli, they might have viewed themselves as unsuitable for surgical careers. The stereotype of the surgical personality for some students may have been transformed into a self-fulfilling prophecy. "The underlying assumption . . . is that surgical professional competency requires traits and characteristics in the surgeon which are incompatible with the needs of patients for sensitivity, compassion, and understanding during an experience of great personal pain and danger" (Coppola & Cochran, 1979). If this was in fact occurring, then

> surgery may be losing a group of bright, sensitive and thoughtful recruits who might otherwise be interested in surgical careers if they could be trained to cope successfully with their reactions to noxious surgical stimuli (Coppola, 1980).

In order to first investigate the actual incidence of this phenomenon, Coppola and Cochran devised the Apprehension to Surgical Procedures Questionnaire (ASPQ) which was administered in March and June, 1979, to Michigan State University College of Human Medicine students at the end of the ninth week of their twelve-week surgical clerkships. These were third and fourth year students, all of whom had completed a minimum of two years of pre-clinical coursework. The questionnaire asked several short-answer questions about the presence, nature, extent, intensity, duration and change of such adverse reactions to surgical stimuli. The results

from this first questionnaire confirmed Coppola and Cochran's earlier observations. Of 72 medical students surveyed on their surgical clerkships, one-third indicated they had experienced physiological reactions such as feeling faint or nauseated while they were in the operating room. Students were asked to describe the reactions they had experienced, to determine if these reactions were related to specific types of operations or operating room stimuli, and to describe what they had done to cope with these reactions. They were also asked to check the extent to which each of 42 specific stimuli bothered them. The data indicated there were emotional as well as physiological components to these reactions and that the reactions frequently seemed tied to specific ("excision of nails of great toes") or general ("long operations; operations where Bovie[1] is used") operating room stimuli. Interpersonal stimuli (e.g. "surgeon's expression of anger," "surgeon making disparaging remarks", distinct from actual surgical or anatomical stimuli (e.g. "intubation," "incision," "blood"), also were identified by students as contributing to their adverse reactions in the operating room.

The confirmation of the existence of adverse physiological/emotional reactions to both "surgical" and "interpersonal" operating room stimuli on the part of

---

[1]Bovie: electro-cautery unit

approximately one-third of the medical students surveyed led Coppola and Cochran to consider more seriously the implications of this phenomenon. Did these adverse reactions interfere in some way with the students' learning process while in the operating room? Did these reactions perhaps affect the medical student's attitudes about self or toward surgeons and surgery in such a way that the student might: 1) have a relatively negative attitude toward surgeons or surgery, or 2) decide against surgery as a career specialty?

The incidence and intensity of medical students' reactions to surgical stimuli as reported on this questionnaire seemed to be inversely related to surgery-related experience, that is, the more experience the less reported reaction, but neither the level of the reactions nor the process by which the reactions decreased was clear. For example, if the student's initial adverse reaction to surgical stimuli was 20 on a scale measuring the intensity or duration of the reaction, it was not clear if the reaction decreased to 10 or 5. Since this was unclear, the relative effect that a preparatory treatment experience might have on the level of these reactions was also unclear.

With these issues in mind, Coppola and Cochran began considering strategies for further verifying the incidence of the problem as well as for investigating the possible relationship between these reactions and the learning and attitudes of medical students on their surgical clerkships. Though still in an exploratory stage, these ideas seemed

sufficiently well defined to be subjected to experimental study. Realizing that these reactions to various operating room stimuli were the dependent variables in this situation, Coppola and Cochran began considering means of ameliorating the impact of these stimuli on medical students and thereby perhaps increasing their learning and improving their attitudes toward surgeons and surgery. A training experience was sought which would be pertinent to:

1) The identified stimuli, both surgical and interpersonal
2) The physiological/emotional components of the medical student's reactions to these stimuli.

In addition, Coppola and Cochran sought a training experience which would be positive, both in process and outcome, for the medical students by fostering increased awareness, acceptance, and perception of control of their reactions and of themselves.

Aware of the research of Kagan to increase the interpersonal effectiveness of medical students in patient interviews through the use of the Interpersonal Process Recall (IPR) method (Kagan, 1975, 1979), Coppola and Cochran (1979) concluded that this method might influence students' adverse reactions to surgical stimuli and students' learning in their surgery clerkships. Embelton's study, conducted in 1979, grew out of the collaboration of Embelton, Kagan, Coppola, and Cochran in the initial exploration of this possibility. Embelton used a matched-

pairs design to test the effectiveness of a treatment consisting of two laboratory I.P.R. sessions (viewing videotaped "vignettes" of actual and simulated surgical situations) on early surgical learning and anxiety in medical students. Embelton's study is reviewed in Chapter 2. The IPR method employed in Embelton's study and in this study is discussed specifically in this chapter and in Chapter 2, and the general rationale for the choice of this treatment approach is presented in Chapter One. The present study grew directly from the Embelton study and was an attempt to:

1) Strengthen the Embelton treatment by adding an instructional videotape and an actual operating room IPR session.
2) Improve the design by using three groups instead of two and by using experience as a blocking variable.
3) Improve and expand the scope of the outcome measures by improving their objectivity and validity.
4) Incorporate an exploration of medical student attitudes toward themselves and surgery.

The remaining sections of this chapter address the need for the study, the theoretical framework used in the present study, a discussion of the treatment approach, definition of terms, assumptions, and a statement of the research questions.

Need For The Study

Although Embelton found no significant differences between experimental and control groups on either learning or anxiety, this lack of significant differences could have resulted from weaknesses in the treatment, design, and/or outcome measures (Embelton, 1981). The present study addressed these weaknesses in a more rigorous attempt to discover any differences which might exist but were not found by Embelton. Specific modifications and additions made in this study are presented in Chapter Two.

The need for the present study was further indicated by the results of the administration of the 1980 ASPQ questionnaire to sixty-eight medical students on their surgical clerkships. These results confirmed the earlier finding that nearly one-third (29%) of these students experienced some unpleasant reaction to operating room stimuli. The present investigation was significant for two reasons. First, the investigation attempted to determine if a relationship existed between students' reactions and subsequent learning (observation) in the operating room. The importance of such a relationship becomes clear when one considers the ubiquity of the surgical clerkship in American medical education. Of the 130 North American allopathic medical schools indexed in the 1978-79 Association of American Medical Colleges Curriculum Directory, 120 included a required surgical clerkship of between four and sixteen weeks. These clerkships include general surgery clerkships

as well as clerkships in various surgical specialties. If adverse emotional/physiological reactions to surgical stimuli were present in about one-third of all medical students entering their surgical clerkships and if these reactions were found to significantly interfere with observation in the operating room, important issues would be raised for surgical education. The meaningful significance of the results, as well as other specific data to be gathered in the study, could be a guide for further research as well as foster consideration of a heretofore largely ignored phenomenon in surgical education.

Secondly, a study was needed to determine if a relationship existed among these adverse reactions to surgical stimuli and medical students' attitudes toward themselves and toward surgery as a career specialty. Embelton (1981) confined his study to the investigation of the adverse reactions/learning relationship. In addition to exploring this relationship more rigorously, the present study sought to investigate this adverse reactions/attitudes relationship. Previous reports (Burke, 1979; Linn, Pratt, & Zeppa, 1979; Chapman, 1976) have indicated the importance of clerkships in the career decisions of medical students, especially the approximately one-third of students who have not made fairly firm career decisions by their senior year (Chapman, 1976). But there has been little actual research on the influence of clerkships on career choice. If there is a link between the medical student's experience on the

surgical clerkship and later career choice, then the possible influence of adverse reactions to surgical stimuli on the student's surgical clerkship experience becomes an important issue. This issue is perhaps most clearly focused in the medical student who is one of the one-third who seem to experience adverse reactions as well as one of the one-third who are unsure of their career choices. The present study, though it did not undertake a longitudinal analysis of actual career choices of the participating students, did attempt to explore student attitudes toward surgery and other specialties and the possible relationship of these to adverse reactions to surgery. In addition, apart from concerns regarding the effects of adverse reactions on learning and attitudes toward surgery, the present study also addressed the relationship between these reactions and medical students attitudes toward themselves in general and specifically toward themselves in the operating room. The need for investigation of this question related to the issue of the possible relationship between medical student self-perception regarding these adverse reactions and the stereotype of the surgeon as a cold, insensitive mechanic. The following section outlines the theoretical framework in which the adverse reactions/learning (observation) relationship was conceptualized in the present study.

Theoretical Framework

An investigation of the early surgical learning of medical students requires some conceptualization of the phenomenon of learning. Of the three major schools of psychological thought, psychoanalytic and its derivatives, behavioral, and existential/phenomenological, the behavioral school has concentrated most on investigating the specific processes and events by which learning occurs. From its origins of classical and operant conditioning, in which the organism was thought to respond quite simply and directly to external stimuli and in which response strength was determined by reinforcement, mainstream behaviorism gradually moved to a position of recognition of "intervening variables" (Tolman, 1938) in its basic stimulus-response-reinforcement paradigm. This position marked acceptance of the organism's mediation of its response through the occurrence of internal processes and events, the "intervening variables." Central among these variables were sensation, perception, memory, and thinking. The acceptance of variables present in the learning process other than those which are observable pointed toward the possibility of common ground with psychodynamic approaches, which emphasized intrapsychic structures and processes, and with existential approaches to the person, which emphasize the individual's unique experience. From this point, investigation into the nature of these intervening variables, the hypothesized internal structures and processes by which

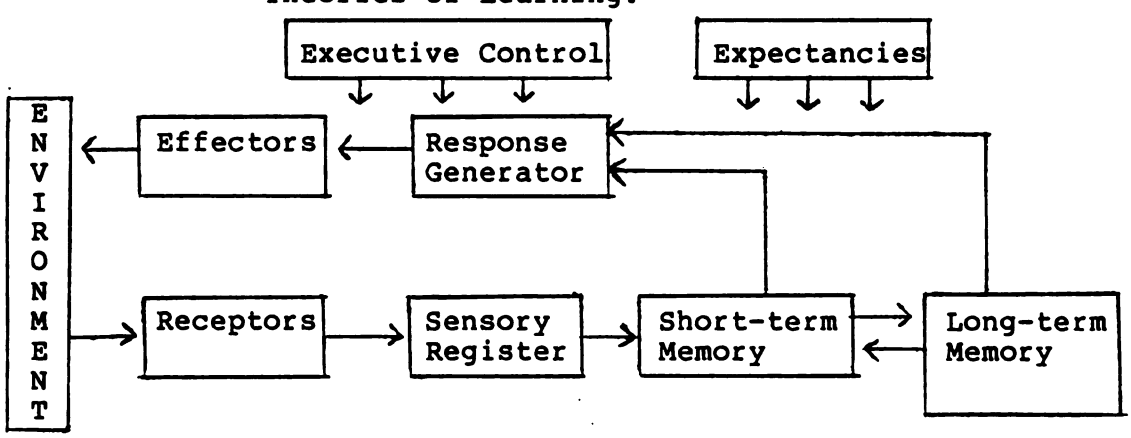
learning occurs, moved toward research and theorizing which focused primarily on building conceptual models to represent the learning process and on testing these models experimentally. Animal learning and verbal learning studies concentrated primarily on the investigation of relatively simple processes of association. In contrast, a new line of research extended in recent years to the study of more complex mental structures and processes, e.g., perception and memory. The field of cognitive psychology, drawing on information theory, computer science, and linquistics, has gradually èmerged as an integrative effort espousing generally the following set of beliefs regarding the way by which the mind processes information:

1. The importance of the selection of stimulus information. Most of the time more information impinges on us than our limited capacities can handle.
2. The importance of selecting appropriate processing strategies (largely under voluntary control) to meet the demands of the task.
3. The development of cognitive structures. After repeated applications of processing procedures, stable cognitive structures emerge.
4. The interrelated functions of the parts of the human mind as a coherent system.
5. The constantly active nature of cognitive processes. The system is always active and at

work. (Reynolds & Flagg, 1977; p. 12)

Inherent in the cognitive psychology view of learning is a reliance on models to approximate and attempt to explain the processes of learning. These information-processing models posit internal mental structures and the kinds of processing which these structures accomplish. One such model drawing on several others, was proposed by Gagne' (1977). This model, as well as a discussion of the specific structures and processes it contains, is presented below. Although learning can be explained in psychodynamic and, perhaps less clearly so, in existential terms, the information processing model is the theoretical model of learning employed in this study. The model has the advantages of relative precision, parsimony and operationalism and does hold promise for learning research, but a significant weakness of the model, and of cognitive psychology in general, is discussed following the presentation of the model.

Figure 1.1: Model Employed by Information Processing Theories of Learning.



(Gagne', 1977, p. 53; Anderson & Bower, 1973; Atkinson & Shiffrin, 1968; Rumelhart, Lindsay, & Norman, 1972).

The receptors of the learner are activated by environmental stimulation and this information persists very briefly in the sensory register. Selective perception of this sensory representation occurs as the learner attends to certain features of the contents of the sensory register while ignoring others. The sensory elements to which the learner attends, synthesized by the process of selective perception, enter short-term memory, where they persist for a limited time, up to about twenty seconds. Short-term memory seems to have a limited capacity, generally thought to be about "seven plus or minus two" (Miller, 1956) individual items. When this capacity is exceeded, old items are pushed out as new items are added.

The process of encoding, by which short-term memory information enters long-term memory, is crucial for learning. Certain perceptual features in short-term memory are transformed into a conceptual mode which is semantic, or meaningfully organized. Material may be encoded as propositions, hierarchical or topical relationships of concepts, and visual and other kinds of imagery. The encoded information is stored in long-term memory. Some evidence suggests that storage here is permanent and does not suffer loss through time (Adams, 1967), but what is stored may become inaccessible for a number of reasons. Interference between new and older memories may block accessibility, and forgetting may be due to the ineffectiveness of search and retrieval processes. Retrieval of long- term memory

information seems to require that external or internal cues (stimuli) be provided. These cues are employed in the search process to recognize and retrieve long-term memory material. This material may then re-enter short-term memory, which may function as a working or conscious memory (Atkinson & Shiffrin, 1968), where it becomes accessible for new encoding transformations; or it may directly activate the response generator, which organizes the form and pattern of the upcoming performance. Activation of effectors results in performance, the externally observable evidence of learning. Reinforcement occurs as a result of feedback, the learner's observation and interpretation of the effects of his/her performance.

Executive control processes and expectancies, largely acquired by the individual in previous learning and therefore constituting another portion or aspect of long-term memory, determine the learner's approach to one or more ways of processing information. Executive control processes and expectancies are capable of affecting any and all of the phases of information processing. The cognitive strategies employed by learners to regulate their own internal processes of attending, learning, remembering and thinking are examples of executive control processes. These processes can exert pervasive influence on the various structures and events of the learning process. The learner's expectancies, what s/he intends and expects to accomplish, can also influence all aspects of information

processing. This concept is related to the purposive aspect of Tolman's (1932) molar behavior and to the efficacy expectations of Bandura (1971). It is important to note that executive control processes and expectancies are themselves learned, shaped by the individual's prior experience and influencing the manner in which the learner functions in the present. Also, external events quite obviously influence the learning process, either by promoting or inhibiting it.

A weakness of the information-processing model and of cognitive psychology in general is the relative lack of recognition of the importance of emotion in the learning process. Indeed, the word "emotion" is not even listed in the table of contents of current texts in this area (Reynolds & Flagg, 1977; Gagne, 1977). These theorists would presumably subsume the emotional context of the learning situation under the aspects of executive control, expectancies and external events, with no more specific attention to the impact of feelings on the individual's processing of information. Cognitive psychology and information-processing theories exhibit a possibly partly reactive philosophical and practical emphasis on conscious thought while largely ignoring the rich contributions of psychodynamic and existentialist theory to the understanding of the influence of emotion on learning and behavior. A growing body of research, however, is exploring the complex relationship between emotional factors and the various

aspects of the learning process. Chapter Two contains a review of relevant literature on this relationship.

A consideration of the possible influence of emotional factors in the context of an information-processing theory of learning should expand our understanding of the specific case under study here, that of the medical student in early surgical training. These emotional factors might best be viewed as a combination of the student's emotional style and emotional-physiological reactions, partly determined by this style, to the surgical scene. From the beginning to the end of the learning process, there are several points at which emotional factors, sometimes manifested physiologically, might influence the outcome of the surgery-learning process. Consider, for example, the medical student's early experiences of observing in the operating room. The student dons surgical clothes and a mask and, amid the bustle of the surgical suite -- patients, surgeons, nurses, technicians, orderlies -- enters the O.R. The student takes in the sights, sounds, smells and atmosphere of the O.R., including the people, their attitude and behavior, the equipment and instruments. Perhaps the student does not plan to be a surgeon but is very interested in this event as an early exposure to surgery. How does this affect him/her? What reaction occurs when the patient is reminiscent of a significant person in the student's life? Perhaps the operation itself has a significant emotional connotation for the student. The patient is "prepped" as the surgeon enters the

room, and the medical student's expectation of "surgeon" meets the reality of this specific experience of a surgeon. As the O.R. personnel ready themselves and the O.R. for the operation to begin, the tension mounts for the student. (Embelton's 1981 study indicated that the medical students generally felt more tension as the moment of the incision approached.). Following the incision, the medical student is witness to the complex interaction of the physical progress of the operation itself with the surgeon and O.R. staff. The scene includes the elemental stimuli of the surgical procedure -- the cutting, clamping, stitching, etc. of the live anatomy of the patient -- as well as the relatively charged interpersonal interactions of patient (conscious or unconscious), surgeon, anesthesiologist and other O.R. personnel. There are several questions to be asked. How is the reaction of the medical student to this scene related to the quality of his/her observation during the operation? Is there a relationship between the student's reaction and attitudes toward surgery? Would students who were less adversely affected by these stimuli observe better than their peers? Can a training experience prepare students to cope effectively with the emotional and physiological components of their reactions to surgical stimuli and improve their observation?

The Treatment

Traditionally, systematic desensitization procedures as developed by Wolpe (1961) have been used to reduce anxiety reactions of people threatened by specific stimuli. Such procedures involve training in deep muscle relaxation and construction of an anxiety hierarchy (a list of stimulus situations which successively approximate the strongest anxiety-evoking situation). Individual training (usually via imagery, sometimes in vivo) is done in active substitution of the relaxation response for the anxiety response, with the ultimate goal of relaxation in the highest anxiety stimulus situation on the anxiety hierarchy. To the degree that the documented unpleasant reactions of some medical students to surgical stimuli may be termed "anxiety," desensitization was a possible choice for a treatment or training experience to decrease the number and intensity of these reactions. But systematic desensitization was deemed inappropriate in the present study for both practical and theoretical reasons. Individual systematic desensitization usually requires from ten to twenty-five sessions (Wolpe, 1958). This requirement was prohibitive on a practical basis. Although there is impressive evidence supporting the effectiveness of the desensitization technique, Embelton (1981) raises interesting theoretical issues about the process by which a student's reactions to surgical stimuli might change as well as about the implications of this process and its outcome for awareness and future learning.

He states:

> there is a strong element of the therapist or experimenter being in control of the learning and the patient or subject being the recipient of the technique. There is yet another factor that relates more specifically to this study. Is it preferable to have medical students "desensitized" to surgical stimuli or should they be "sensitized" to the whole surgical experience? The term sensitized is used here in the sense of the ability to express both cognitively and emotionally the impact of the procedure upon oneself without denying the anxiety or threat that might be occurring . . . Desensitization of anxiety inhibits the awareness of stimuli whereas a process of sensitization encourages the individual to acknowledge and deal with the anxiety of the impact of stimuli and events. It would seem that the latter process would be more helpful in developing within students an awareness of their own interpersonal and physiological reactions. (Embelton, 1981, p.13)

Sensitization or increasing the awareness of medical students to their reactions to the surgical scene would encompass Coppola and Cochran's training criteria, outlined above. On a philosophical level, a process of sensitization indicates an acceptance of the reactions under study as natural responses to surgical stimuli. Sensitization thus represents both a means and an end, a process and an outcome, different from that represented by desensitization. Sensitization represents an accepting recognition of the naturalness of the reactions under study, a recognition which implies that increased awareness and understanding of these reactions will foster self- and other-awareness resulting in a more sensitive and rewarding approach to patient care.

Other treatment approaches and training programs such as Anxiety Management Training (Suinn, 1977) seemed to embody techniques and principles similar to those of systematic desensitization and were ruled out of the present study for similar practical and theoretical-philosophical reasons. In addition, since the present study was developed as a follow-up to the Embelton (1981) study, it was desirable to build on a treatment already tested.

As in Embelton's study, the treatment approach employed in the present study was the Interpersonal Process Recall (IPR) method developed by Kagan (1979). The method essentially involved the presentation of videotaped "stimulus vignettes" which portrayed an actor or group of actors simulating a "stimulus situation" which might have emotional impact on the subject viewing the vignettes. After viewing the vignettes, the subject discussed his/her reactions with the help of an inquirer trained in the recall process. The recall process was the core of the IPR method. It enabled the subject to explore his/her reactions to simulated, potentially powerful interpersonal situations in a relatively non-threatening, person-centered context. The inquirer's role was to facilitate the subject's exploration of personal reactions to the vignettes by asking considered, exploratory questions about the person's physical, emotional, and cognitive experience while viewing the vignettes. The IPR method has been used to improve interactional skills in a variety of educational, mental health

and military settings. However, its use in the teaching of patient interviewing skills to medical students (Werner & Schneider, 1974) led Coppola, Cochran and Embelton to employ the method as the treatment of choice in their investigation of medical students' early reactions to surgical situations. Their goal was to increase students' awareness and acceptance of their reactions and thereby to improve early learning in surgery. The IPR method and its specific use in the present study are more fully explained in chapters Two and Three.

Definition Of Terms

Emotional/Physiological Reactivity

The term "emotion" is used in this study to refer to "complex, qualitatively different feeling-states or conditions of the human organism that have both phenomenological and physiological properties" (Spielberger, 1972, p.27). Stimulus-response operations alone cannot account for the breadth and depth of human emotional experience. Individual personality and experiential differences must be taken into account, for these crucial factors influence the individual's appraisal of a particular situation and therefore his/her response to it (Lazarus and Opton, 1966).

Interpersonal Process Recall (IPR)

Interpersonal Process Recall is a method for influencing human interaction developed by Kagan (1975, 1979). The essential element of the method is the "recall",

or review, by audio or video tape,of an interaction by one or more of the participants. This recall is facilitated by an "inquirer" whose role is one of other-centered exploratory questioning of the person with the goal of maximizing the person's awareness of emotional/cognitive /physiological reactions during the taped interaction. The inquirer respects the primary control of the person in determining the scope and content of the recall. The overall goal of the method is the enhancement of interactions through increased awareness of one's "interpersonal processes." In further development of the model, videotaped "stimulus vignettes" are used to simulate potentially stressful interactions. Student subjects are filmed while viewing these vignettes in a laboratory setting while heartrate, skin conductance, and respiration are recorded by a Grass recorder. In recent work, these physiological measures are sampled by a computer and displayed in various forms on a monitor during the recall. In the present study, students viewed vignettes of actual and simulated surgical scenes in the laboratory and also experienced a recall of an actual operating room experience during which they were videotaped.

Learning

In this study, a specific aspect of the learning process, observation, was measured by the Operating Room Experience inventory. Building on anatomy and physiology,

the learning of surgical procedures depended on observation and gradual participation in the operating room through the course of the surgical clerkship and possibly later the internship and residency. According to Bandura (1971), a great deal of human learning is accomplished vicariously, through observation and subsequent imitation. This is certainly true of the learning of surgical procedures.

Surgical Clerkship

The surgical clerkship is one of several "apprenticeships" which medical students serve following their initial two to three years of preclinical coursework. Other required clerkships are internal medicine, obstetrics-gynecology, pediatrics, family practice, and psychiatry. Surgery clerkships vary from four to sixteen weeks. The College of Human Medicine at M.S.U. requires a twelve-week general surgery clerkship. Elective four-week clerkships in specialty fields (e.g. ophthalmology, urology) and a further general surgery clerkship are available in addition to the twelve-week requirement. The College of Osteopathic Medicine at M.S.U. has no surgery clerkship requirement. During the clerkship, the medical student works full-time in a hospital and spends about ten to fifteen hours per week in the operating room. Student experiences vary of course with the nature of the practice of the doctors to whom they are assigned. The surgical clerkship is the primary period of direct exposure to and practice in surgery for most medical

students who do not choose a surgery career, and it is frequently the earliest intense experience in surgery for future surgeons.

Assumption

The main assumption was that the physiological-emotional reactions of M.S.U. medical students entering their surgical clerkships are similar in kind and intensity to those of other medical students.

Research Questions

This chapter attempted to document the pervasiveness of medical students' adverse reactions in the O.R. (Cochran & Coppola, 1982). The IPR method was described as one means of reducing these reactions and ultimately improving early surgical learning. The research questions which this study addressed relate to: the nature of medical students' emotional-physiological reactions to early surgical experiences; the effects of these reactions on students' observational ability in the operating room; the effects on student attitudes toward themselves, surgeons, and surgery; and the effects of an IPR -based treatment experience on these variables. The specific hypotheses relating to these general questions are stated in Chapter Three.

CHAPTER II

REVIEW OF LITERATURE

Introduction

This chapter contains a review of the literature on the relationship between emotion and learning; the role of the clerkship in medical students' career choice; medical students' attitudes toward surgery and surgeons; and the Interpersonal Process Recall method, especially as it relates to medical student training. The last section of the chapter reviews Embelton's 1979 study.

Emotion and Learning

The influence of emotional factors on learning has been studied in a variety of ways. Investigation of the negative impact of emotion on learning has been focused largely on the relationship between anxiety and learning. This section includes a review of theory and research on anxiety and recent research on the relationship between emotion and performance.

May (1977) surveyed the problem of anxiety in literature, art, politics, philosophy, theology and psychology. He characterized anxiety as both a perceived threat and a positive challenge to life, to selfhood,

concluding that "the positive aspects of selfhood develop as the individual confronts, moves through, and overcomes anxiety-creating experiences" (May, 1977, p.356). Rogers (1951) describes the relationship between threat and the assimilation of experience (learning) thus:

> The structure and organization of self appears to become more right under threat; to relax its boundaries when completely free from threat. Experience which is perceived as inconsistent with the self can only be assimilated if the current organization of self is relaxed and expanded to include it (p. 390).

Existentialists such as Kierkegaard (1944) have pointed out that anxiety is a fact of life and that the creative struggle with the anxiety associated with new possibilities is the essence of hope for life. They also "insisted that reality can be approached and experienced only by the whole individual as a feeling and acting as well as a thinking organism" (May, 1977 p. 31).

Some theories of anxiety emphasized unsolved conflicts within the self or between structural elements of the personality. In his theory of personality, Freud (1924, 1933) first conceptualized anxiety as the result of repression, reasoning that the affective components of id impulses were transformed into anxiety when these impulses were repressed. He later saw anxiety production as a function of the ego when it perceived danger to itself, whether the threat was internal (id impulse or superego censure) or external. The ego took steps to reduce the anxiety, steps such as repression and symptom formation.

The economic aspect of Freud's theory held that repression was not a finished act when it occurred, but rather that a constant expenditure of energy was required to maintain the repression. Freud distinguished three kinds of anxiety: 1) objective or realistic, implying a real known external danger; 2) neurotic, implying an instinctual danger, a fear of being overpowered by some impulse or thought that will prove harmful; and 3) moral, implying a perception of danger from the superego, experienced as feelings of guilt and shame.

Following the progression of psychodynamic thought from its early emphasis on instinctual influences, ego psychologists later conceptualized anxiety in object relations terms and in terms of a developmental progression. They conceptualized early anxiety as a fear of annihilation and later anxiety as fear of loss of a significant object or of the object's love. The prototypical anxiety experience, upon which later anxiety is based, was that of separation from the mothering person (Blanck & Blanck, 1974). The severity of later anxiety experiences is related to the extent to which adequate separation-individuation occurs in this early developmental process.

The relationship between learning and anxiety in psychoanalytic and ego psychological theory can best stated in terms of the reality principle, by which the ego operates in balancing the internal demands of the id and superego with the requirements of the environment. Adaptive or

learned behavior, instrumental in adjusting the person to reality, is done in the service of the reality principle. The nature and degree of anxiety in the person directly influence the defensive functions undertaken by the ego to ward off the anxiety. With anxiety reduction as their goal, these defensive functions require a distortion of reality in proportion to the strength of the anxiety. Both the defensive style employed by the individual (Shapiro, 1965) and the degree of rigidity of this style exert primary importance in the context of the learning situation.

While psychodynamic theory emphasized the characteristic patterns of perception and behavior which a person brings to a new situation, early behaviorists focused on the properties of the stimulus situation and viewed the person's response as being largely determined by the stimulus. In terms of learning and anxiety, a response which serves to reduce anxiety is reinforced by virtue of that fact. In an attempt to integrate psychodynamic theory and reinforcement learning theory, Dollard and Miller (1950) conceptualized anxiety or fear as a major learned or secondary drive which acquired its strength through association with primary drives such as pain, thirst and hunger. Their principles of learning are based on drive reduction as well the importance of previous learning and the varied motivations of the individual.

Miller and Dollard (1941) also contributed to the emergence of social learning theory, which was articulated

more recently and thoroughly by Bandura (1969, 1971). Bandura offered a synthesis of cognitive psychology's emphasis on such processes as perception and memory and the behavior modification focus on properties of the stimulus situation such as reinforcement. While it accepts the traditional learning theory emphasis on learning by doing and the application of reinforcement contingencies to practiced responses, social learning theory also holds that a great deal of human learning is accomplished vicariously, through observation and subsequent imitation. The observer often learns and later performs novel responses without ever having made them before and therefore without reinforcement. A further contribution of social learning theory concerns the important distinction between learning and performance. In a study by Bandura, Grusec and Menlove (1966), children observed a child model in a film perform a series of novel, aggressive acts. The model received either rewarding, neutral or punishing consequences in the film from a "teacher." When the child was later allowed to perform in a similar situation, the frequency of aggressive responses imitating those of the model varied directly with the reinforcement of the model shown in the film. However, when incentives were offered in a second test for reproduction of the model's behaviors, the differences in imitation virtually disappeared among subjects exposed to differentially rewarded models. The children had apparently learned the same amount from observing the model's behavior but they

performed more or less of that behavior depending on whether they "expected" to be reinforced for it. Furthering Tolman's expectancy theory (summarized and interpreted by MacCorquodale & Meehl, 1953, 1954), Bandura (1977) drew a distinction between "outcome expectations," the belief that a given behavior will lead to particular outcomes, and "efficacy expectations," the belief that "one can successfully execute the behavior required to produce the outcomes" (p. 193). Bandura subsumed "anxiety," a more psychodynamic-existential term, under his efficacy expectations. These are determined largely by performance feedback from prior experience and are the primary determinants, in Bandura's view, of coping and defensive behavior.

In his analysis of observational learning, Bandura (1971) emphasized attentional and retention processes, which involved imaginal and verbal representational systems, and motoric reproduction skills and reinforcement. Experimentation (Bandura, Grusec, & Menlove, 1966) has shown that interference with the attentional and retention processes decreases observational learning. Social learning theory and research integrates more traditional theories of learning with the more recent emphasis on information processing theories of learning, which in turn have examined and clarified the nature of the processes which Bandura outlined.

A number of investigators have studied the influence of anxiety on learning and information processing. Arnold

(1960) and Lazarus (1966, 1968) emphasized the importance of appraisal and reappraisal of threat in determining emotional experience and expression. Lazarus (1966, 1968) argued that there are two basic kinds of processes by which individuals may cope with threat or anticipated harm. These are direct actions and reappraisals of the situation. Reappraisal of the threat is likely to be the predominant mode of coping where direct actions are not possible. Reappraisal may proceed from a (more) benign appraisal to a (more) threatening appraisal, or from an initially threatening appraisal to a benign appraisal. Reappraisal may be predicated on objective, new stimulus evidence and therefore involve good "reality testing" or it may represent a "defensive" distortion of reality. A study by Speisman, Lazarus, Mordkoff, and Davison (1964) intervened directly to alter the manner in which subjects appraised or interpreted the events portrayed in a stressful film. Three sound tracks were created for a film titled Subincision which depicts crude genital operations among Australian aborigines. The tracks varied in their capacity to raise or lower autonomic and subjective stress reactions of subjects viewing the film. A "trauma" track increased stress reactions to the film, while "denial" and "intellectualization" tracks reduced stress. Essentially the same results were found by Lazarus and Alfert (1964) when they modified the experimental approach by changing the sound tracks into orientation passages which were played before the subjects watched the film. The

reduction of stress in this manner was referred to as the "short-circuiting of threat" and was employed by Lazarus, Opton, Nomikos, and Rankin (1965) with another film depicting wood-shop accidents and showed similar results.

In addition to the findings concerning the effects of appraisal and reappraisal of threat as influenced by "mental sets" given to subjects, Speisman et al. (1964), who selected subjects characterized either as "deniers" or "intellectualizers", also found an interaction, though not a particularly strong one (Lazarus, Averill, & Opton, 1970), between the effects of the two defense-oriented soundtracks and these two defensive dispositions. The stress of intellectualizers was reduced more than that of their denier counterparts when they heard the intellectualization soundtrack, whereas deniers "preferred" the denial soundtrack in terms of stress reduction.

To the extent that dispositional factors (Lazarus, et al., 1970) such as defensive style contributed to one's "mood" at any given moment, the work of Bower (1981) and Weingartner, Miller, and Murphy (1977) supported the influence of mood on another sub-process within the learning process, that of memory. Mood was induced by imagination guided by hypnotic suggestion with college students in the Bower study and by studying psychiatric inpatients who cycled between states of mania and normality in the Weingartner et al. study. These studies showed a mood-state-dependent (Weingartner et al.) or an affect-

state-dependent effect (Bower) on encoding, storage and retrieval of word lists, events, personal experiences, and free associations to neutral words. Roth and Rehm (1980) found direct effects of mood on the interpretation of interpersonal scenes, especially ambiguous ones, in depressed and non-depressed psychiatric patients.

In a review of anxiety research in educational psychology, Tobias (1979) pointed out that there has been little consistency in research findings on the interaction between anxiety and instructional methods. Citing replication as a problem, Tobias offered an information processing research model which hypothesized that anxiety can affect learning at the preprocessing, processing, and post-processing stages by impacting on the cognitive processes mediating learning at these stages. At the preprocessing stage, Sarason (1972) and Wine (1971) suggested that more anxious students divide their attention between the demands of the task and preoccupations with somatic concerns and negative self-references. Less anxious students generally devoted more of their attention to task demands and less concern to task-irrelevant issues. The greater the interference at this point, the smaller the proportion of the instructional content available to be processed. Therefore:

> Any procedures that permit students to reinstitute some segment of input reduce the potential interference of anxiety at this stage. Such operations as being able to rewind an audio or video tape, being able to branch back to prior segments of instruction, and comparable operations

> should reduce this source of interference and ought to be especially beneficial to the performance of high anxiety students (Tobias, 1979, p.575).

At the processing stage, Tobias saw three factors as interacting with the level of anxiety. These factors were difficulty of content, reliance on memory, and organization of the task. More anxious students generally did more poorly than their less anxious counterparts with more difficult content, tasks requiring greater reliance on short- and intermediate-term memory, and less organized tasks. The differences between more and less anxious students were smaller or disappeared with less difficult material, tasks requiring greater reliance on long-term memory, and more organized tasks. Since Wolpe's (1958) systematic desensitization, a variety of approaches have been employed to reduce tension and anxiety in testing and evaluative situations. Tobias (1979) categorized these approaches in three groups: applied relaxation techniques; self-control training techniques using guided rehearsal, in which students are encouraged to confront a stressful stimulus within the training program; and cognitive coping techniques which focus especially on decreasing negative self-references which occur to students in stressful situations.

Spielberger (1966) compared the performance of high- and low-anxiety students in laboratory and real-life learning tasks. Performance of the high-anxiety group varied as

a function of the difficulty of the task and the stress of the situation. These students generally performed better than low-anxiety students on less difficult and less stressful tasks. Spielberger, Gorsuch, and Lushene later developed the State-Trait Anxiety Inventory (1970) which attempted to take into account the theoretical and practical differences between chronic (trait) anxiety and relatively situation-specific (state) anxiety. The "state" form of the STAI will be used in the present study to assess anxiety experienced by medical students while observing a surgical procedure.

Investigators of test anxiety (Sarason, Mandler & Craighill, 1952; Sarason & Palola, 1960) demonstrated that performance of the highly test-anxious varied as a function of evaluative stress. At low stress levels, highly anxious subjects performed as well as those who were less anxious. At higher stress levels, however, the highly anxious performed at levels lower than the low-anxious or than themselves when stress was low. These studies provided further evidence of the Yerkes-Dodson (1908) "Law" which described the curvilinear relationship between learning (or performance) and the drive state or anxiety level of the subject. In his analysis of this curvilinear relationship, Easterbrook (1959) brought the concept of "range of cues utilized" directly to bear on the learning-anxiety interaction, concluding that " when the direction of behavior is constant, increase in drive is associated with a reduction

in the range of cue use" (p. 183). Easterbrook defined drive in this formulation in terms of physiological activation in response to a state of biological deprivation or noxious stimulation. Green (1980) has clearly stated a significant implication of Easterbrook's analysis:

> Drive may either facilitate or inhibit performance, depending on the importance of peripheral cues for performance. Increasing drive up to a point will lead to the elimination of noncentral stimuli that are unimportant and possibly distracting, but further increase will narrow the focus to the point that necessary central cues are being eliminated. Furthermore, the level of drive at which the transition occurs should be lower for complex tasks than for relatively simple ones because, in the former case, a wider range of cues may be necessary for good performance (p. 44).

Seemingly contradictory findings, in which anxiety was found to be associated with a broadened range of perception of stimuli, were reported by Schmidt (1964) and Solso, Johnson and Schatz (1968). Dusek, Mergler, and Kermis (1975, 1976) found that low-anxiety children learned a central task better than high-anxiety children but showed poorer learning of incidental stimuli. These findings seem to support a hypothesis offered by Wachtel (1967) that arousal has two effects on attention and cue utilization: increasing the range of stimuli scanned while simultaneously narrowing the focus or depth of attention within any given area searched.

Problems also exist in viewing state and trait anxiety as unitary concepts. Deffenbacher (1980) illustrated at least two dimensions of state anxiety which are differentially related to performance. The dimension of worry,

which referred to "focusing of attention on concerns about performance, consequences of failure, negative self-evaluation, evaluation of one's ability relative to others, and the like" (p. 112), consistently related inversely to performance. Simply stated, as worry increased, performance decreased. The dimension of emotionality, which referred to "the affective-physiological experience generated from increased autonomic arousal" (p. 112), showed less clear effects on performance. Emotionality was sometimes unrelated to performance and sometimes decreased performance.

A further explication of the multidimensionality of the concepts of trait and state anxiety was made by Endler (1980). Positing cognitive-worry and emotional arousal components in state anxiety and such facets of trait anxiety as social evaluation and physical danger, Endler attempted to integrate multiple dimensions of anxiety into a "person-situation interaction model of anxiety" (p. 249). In asserting his belief that person-by-situation interactions were more important than either persons or situations with respect to personality theory, Endler both reaffirmed the complexity of the learning-anxiety relationship and offered a promising model for further exploration of this area.

The Clerkship in Medical Students' Career Choice

To begin to understand the role clerkships, and especially the surgical clerkship, play in the career choices of medical students, it is important to consider

this issue within the developmental context in which it occurs. Career choice patterns of medical students have been a subject of growing interest to investigators in recent years. In a presentation at the Sixteenth Annual Conference on Research in Medical Education, Hutchins (1977) stated: "There is a long line of decision links that begin prior to entrance into medical school, continue through medical school and into post-graduate education culminating in the actual professional situation" (p. 387). Hutchins' (1964) longitudinal study showed that career choice patterns of medical students were quite changeable and that these patterns of change were dramatic over the years. A three-year study of University of California at Davis medical students showed that students chose several fields of interest early in medical school, mostly in primary care areas such as family practice, and gradually settled on a career choice by senior year (Brown and Burr, 1977). The Cooperative Michigan Longitudinal Study of Medical Student Career Choice (1978), jointly sponsored by Michigan State University's College of Human Medicine and the University of Michigan and Wayne State University Schools of Medicine, generally concurred with the Brown and Burr (1977) findings, showing early exploration of career alternatives and convergence on choice in years three and four. The Michigan Study (1978) found the highest level of stability of choice over four years within the referral specialties which include medicine, pediatrics and surgery.

In this study, data collected from 2,635 medical students over their four years of medical school showed that 50% of those who chose surgery at the end of their first year also chose it at the end of year four. Of nine specialty areas, only internal medicine/pediatrics and obstetrics/gynecology were as high or higher in stability. Conflicting results were found in a study of 1500 students in eight classes at Ohio State University College of Medicine (Sachs, 1977) which revealed a similar degree of stability of choice across four major groupings: 1) primary care, including family medicine, internal medicine, and pediatrics; 2) operative, including ob/gyn, ophthalmology, otolaryngology, and surgery; 3) hospital-based, including anesthesiology, emergency medicine, pathology, physical medicine, and radiology; and 4) other, including preventive medicine and psychiatry.

Wasserman, Yufit, and Pollack (1969) reported that over 50% of the students studied (N = 106) made no permanent change in specialty choice (among fourteen specialties) from freshman to senior year. The Sachs (1977) study, however, reported a much lower degree of agreement. Slightly more than 25% (N = 900) indicated the same choice of four major groupings in their freshman year and internship year. Further evidence of a high degree of change in career preferences over the four years of medical school was found by Bruhn and Parsons (1965) and Livingston and Zimet (1965).

The influence of specialty needs on career choices of

medical students is unclear. Williams (1976) and Spivey (1976) held that the increase in medical school graduates and a corresponding predicted oversupply in some surgical disciplines would be as important or more important in surgical career choices than other psychological, sociological or educational factors. Mueller (1976) concluded, however, that the career preferences of United States medical graduates were "undoubtedly related to personal and individual choices and have little or no relationship to manpower needs" (p. 22).

Concerning stability of choice in the senior year of medical school, Hutchins (1964) and Chapman (1976) reported that one-third of students tend to change their minds one or more times during their senior year. This brings into sharp focus the importance of the clinical clerkships, normally undertaken in the third and fourth years of medical school, in medical students' career choices. Burke's (1979) outcome evaluation of a clinical - level community medicine clerkship indicated that the clerkship had a significant impact on the career direction and attitudes of the medical students who went through this program. Clerkships "assist the student to gain perspective on the realities of various types of medical and surgical careers and thus improve career choices" (Mueller, 1976 p. 23). One of the conclusions which Sachs (1977) drew from the large data pool was that specialty choice became much more solid after one year or more in the operative clerkships. "The choice at

graduation on a detailed or a group basis shows 80% and 88% agreement, respectively, with the choice as indicated at the end of the first year of internship" (p. 219).

For the purpose of the present study, a specific aspect of the surgical clerkship, that of time spent in the operating room and the effect of the clerkship O.R. experience on medical students' attitudes and career choices, was especially relevant. Linn et al. (1979) sought to investigate these factors by surveying junior medical students (n = 164) on interest in surgery before and after their surgical clerkship. The percentage of students whose interest changed positively was 44%, while about 44% remained about the same and 12% changed in a negative direction. The focus of the Linn et al. study was not on those students whose attitudes toward surgery remained essentially unchanged but on those students "for whom the clerkship appeared to serve some definite function in attracting or repelling them in terms of their interest" (p. 153). Of fifteen different clerkship experiences, time in the operating room was one of three experiences[2] rated significantly less favorably by students who changed negatively in their interest in surgery than by those who changed positively. Clerkship grades did not correlate significantly with interest change. Almost half of the negative group changed their career preference from surgery at the beginning of the

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[2]The other two were time spent on the wards and adequacy of supervision of workups.

clerkship, none was interested in surgery at the end of the clerkship, and none entered a surgical residency later.

The Linn et al. (1979) study did not investigate specific aspects of the factor of time spent in the operating room, such as quality and quantity, and the relative influence of these on overall student evaluation of the clerkship. Another study of a similar phenomenon, however, found that senior medical students who spent 15% or more of their preceptorship time in the emergency room scored significantly lower on a simple self-report measure of anxiety experienced in the E.R. than did students who spent less than 15% of their time in the emergency room (Sivertson & Stone, 1980). The two groups were not significantly different on self-reports of anxiety for working in the emergency room prior to the preceptorship.

Finally, it is important to recognize that the surgical clerkship affects the career choices and attitudes toward surgery of both those students who later elect surgical careers and those who do not. Calling surgery "the ultimate audio-visual aid to learning" (p. 23), Mueller (1975) asserted that

> The record indicates that two-thirds to three-fourths of medical students elect careers in non-surgical fields, and the surgical clerkship must therefore prepare these individuals for their fields as well as provide an introduction to a surgical residency for the one-fourth to one-third of students who elect surgery and/or its specialties (p. 22).

Medical Students' Attitudes Toward Surgeons and Surgery

The literature on medical students attitudes toward surgery is quite consistent in its findings. In a study of 141 male University of Colorado medical students, Zimet and Held (1975) divided the students into psychiatrists, pediatricians, family practitioners, internists and surgeons on the basis of their freshman year specialty choice and then re-surveyed the students in their sophomore and senior years. Twenty-three percent of the students chose surgery in their freshman year, 11% in their sophomore year, and 23% in their senior year. Using 117 adjectives from the Gough and Heilbrun Adjective Check List (1965), Zimet and Held obtained ratings of status, social attractiveness, and similarity-to-self on the five specified specialty groupings. As was true within the other four specialty groups, the surgery group viewed surgery as higher in status than the other four specialty groupings. Surgery was given a high status rank by all the other specialty groups except psychiatry. In terms of social attractiveness, surgery consistently ranked last, and in senior year all other groups rated surgery significantly lower than did the surgery group. The findings regarding the similarity-to-self ratings revealed that "surgery consistently ranked last in similarity-to-self for the student group as a whole. Even those in the surgery group described themselves very differently from the way they described the typical surgeon" (p. 164). A later study by McGrath and Zimet (1977)

confirmed these results for female medical students, although the percentage of female students choosing surgery as a career specialty was much lower than that of male students. Gough (1975) also showed that female medical students and physicians differ from men in expressing less preference for surgery and urology and more for obstetrics and gynecology. Matheson and Smith (1977) explained such sex differences in a historical context. They stated:

> Females have not entered the surgical specialties in any significant numbers perhaps because there is some feeling among female medical students that there is a bias in favor of males in that specialty. Of the four students who listed difficulty in getting a residency as the reason for choosing a specialty other than their preferred one, all four were female and all four indicated surgery as their preference (p. 550).

Matheson and Smith (1977) also examined the relationship between specialty preference and specialty choice. They found that surgery was more preferred than chosen, and related this to the low ranking of surgery in terms of perceived demand over the next ten years. They also investigated the relationship between specialty preference/choice and the personality variable intolerance of ambiguity (defined as a tendency to be threatened by ambiguous or unstructured situations). Surgery and obstetrics-gynecology were perceived as highly structured and psychiatry as highly unstructured. Their hypothesis that students who preferred but did not choose surgery would have more tolerance for ambiguity than students who actually chose surgery was supported.

Bruhn and Parsons (1964), in investigating medical students' attitudes toward surgeons, found that medical students viewed surgeons as "domineering and arrogant, aggressive and full of energy, and mainly concerned with own prestige" (p. 43). These attitudes contrasted sharply with those toward the general practitioner, whom medical students view as patient, friendly, sensitive, and deeply interested in people.

De Palma, Izant, Jordan, Holden, and Sheehan (1974) described a surgical clerkship program consisting of an introductory five-week clerkship at the beginning of the third year and a later core clerkship of two months, the latter having both cognitive and affective goals as well as psychomotor goals. They concluded that the core experience was more important in influencing career choice than introductory exposure. They reported an increase in the proportion of students applying for straight surgical internships and stated that "negative attitudes expressed by students about surgeons as physicians are now notably absent. The fact that many students now have their first major clinical experience on a surgical service probably relates to more positive student attitudes" (p. 920).

Interpersonal Process Recall (IPR)

The IPR model and its use in the present study was described in the Definition of Terms section at the end of Chapter One and is further described in Chapter Three. This

section reviews some of the significant literature relevant to the model, especially that pertaining to improving medical students' interviewing skills.

The model was conceived in 1962 at Michigan State University by Kagan and his associates (Kagan, Krathwohl & Miller, 1963; Kagan & Krathwohl, 1967). It has been used with a variety of groups in a variety of settings to improve interaction: with counselors and clients (Goldberg, 1967; Kingdon, 1975; Tomory, 1979); with teachers in urban schools (Burke & Kagan, 1976); with residence hall assistants (Dendy, 1971) and college students (Archer & Kagan, 1973); with prison counselors (Grzegorek, 1970) and inmates (Singleton, 1976). Positive effects of application of the model, such as improvement in interviewing skills, in affective sensitivity, and self- actualization, in client self-exploration and in empathy skills as measured by such measures as the Counselor Verbal Rating Scale (Kagan & Krathwohl, 1967), the Affective Sensitivity Scale (Danish & Kagan, 1971), the Personal Orientation Iventory (Brammer & Shostrom, 1963), the Wisconsin Relationship Orientation Scale (Steph, 1963), and the Carkhuff Accurate Empathy Scale (Carkhuff, 1969). Each drill sergeant in the U.S. Army currently completes an IPR course as part of basic drill sergeant training and the model has been translated into Swedish, Danish and German (Kagan, 1982).

Jason, Kagan, Werner, Elstein, and Thomas (1971) adapted the IPR model for use with medical students by using

simulated patients, actors trained to play patients in various conditions of health or illness and with varying interpersonal styles. Significant gains in interviewing skills and in sensitivity to interpersonal messages using this approach (Resnikoff, 1968; Werner & Schneider, 1974) led to the introduction of "stimulus vignettes," in which videotaped actors and actresses simulated one side of various emotionally impactful interpersonal situations (Kagan & Krathwohl, 1967; Kagan & Schauble, 1969; Danish & Brodsky, 1970). New sets of vignettes were created to simulate potentially stressful interactions in specific contexts, e.g. for teachers and medical students, and these were incorporated into training programs such as that for Michigan State University College of Human Medicine students reported by Werner and Schneider (1974). The demand for such training in interpersonal skills and its importance in medical education and health care delivery was discussed by Kagan (1979).

In a personal communication to Kagan, Coppola and Cochran (1979) outlined their findings about the incidence of negative reactions to surgical stimuli among medical students entering their surgical clerkships and suggested that the IPR method might be adapted to assist students in reducing emotional and physiological responsiveness and to facilitate early learning in surgery. This collaboration resulted in the Embelton (1981) study and the current study.

The Embelton Study (1981)

Embelton's subjects were twenty-three male and twenty-five female students from the Colleges of Human and Osteopathic Medicine at Michigan State University. Treatment and control students were matched according to year of training, experience in surgery, and medical school curriculum (Track One designating a more traditional approach and Track Two a small-group and individual learning approach). Treatment consisted of two sessions in the IPR laboratory at Michigan State University for each treatment group student. In these sessions, the students viewed videotaped vignettes of actual and simulated operating room scenes and recalled their reactions with an inquirer while viewing the videotape of themselves viewing the vignettes. They also reviewed analogue records of their physiological reactivity during the recall.

Matched pairs of treatment and control group students then viewed an actual operation together and responded to two outcome measures, the Operating Room Experience Inventory and the Apprehension to Surgical Procedures Questionnaire. Embelton found no significant differences between his groups on either of these measures.

Embelton's vignettes were five to fifteen seconds in length. The treatment consisted of two IPR lab sessions. The current study was an attempt to improve on the Embelton study by using new and longer vignettes, adding an instructional component to the end of the second laboratory

session, and adding to the treatment a recall of the student viewing an actual surgical procedure. Three groups were used in the current study in an attempt to rule out alternative hypotheses, such as positive effects of actual or videotape viewing of operations, if significant results were found. Embelton's outcome measures were further objectified and improved and several other measures were added to expand the scope of the investigation. The specific methods and procedures employed in the present study are described in the following chapter.

CHAPTER III

METHODS AND PROCEDURES

Population

Medical student participation in the project was invited through a series of three letters circulated to all first- and second-year students in the College of Human Medicine (CHM) (n= 200) and the College of Osteopathic Medicine (COM) (n= 250) at Michigan State University in the spring of 1980 (Appendix A). The first two letters outlined the project in general terms and indicated a tentative time commitment that students could expect to give over the summer of 1980. The third letter emphasized that the project was especially pertinent for students with little or no surgical experience and that this was an opportunity for them to gain experience. The project was approved by the University Committee on Research Involving Human Subjects as well as by the Medical School Research Office.

Sample

Sixty-three students returned participation forms indicating their interest in the project as well as the extent of their surgical experience. Two of these students (one male, one female) were unable to participate due to changes in their summer schedules. Of the sixty-one

students who were able to participate, forty-five students completed all phases of the project. The following table contains a description of characteristics of those who completed the project and those who did not.

Table 3.1: Participant Characteristics

	Did not Complete Project (n=16; 26%)	Completed Project (n=45; 74%)
Male	3 (7%)	40 (93%)
Female	13 (72%)	5 (28%)
COM (Osteopathic)	8 (21%)	30 (79%)
CHM (Allopathic)	8 (35%)	15 (65%)
1st Year	12 (25%)	36 (75%)
2nd Year	4 (31%)	9 (69%)
Mean Age	24.9 (Range 22-30)	26 (Range 22-39)

Whereas the "typical" student who did not complete the project was a female first-year student, the typical student who completed the project was a male first-year osteopathic student. Completion of the project depended to a great extent on time availability and scheduling, because the outcome phase of the project involved sets of three students, one from each group, observing the same operation. Consistent contact with students throughout the summer was required. Although the scheduling and design requirements

of the project, especially the outcome phase, were a factor in the incomplete participation of sixteen students, additional possible factors, perhaps related to the differential experimental mortality of male and female students and of osteopathic and allopathic students, will be discussed in Chapter Five.

Students interested in participating returned the participation form (Appendix B) which provided demographic, surgery-related experience, and scheduling information. An "experience score" was obtained for each type of surgical experience listed on the participation form. The highest score was assigned to assisting in an operation in the operating room and the lowest score to observing an operation in a physician's office (Appendix B). This gradation of scores represented an estimate of the relative physiological-emotional impact of these experiences on students and was determined through discussion with a small group of non-participating first and second year medical students. Students were then ranked by total experience scores. All students who returned participation forms were contacted and the project was explained. Students were told that the purpose of the project was to investigate medical students' reactions to surgery and that they would be divided into groups which would all have the opportunity for the same experiences, but in different sequences.

Design

The experimental design employed in the study represented a three-group posttest-only control group design graphically represented in Figure 3.1.

Figure 3.1: Design of Study

R	X_1	O
R	X_2	O
R		O

R indicates random assignment,

X indicates treatment, and

O indicates outcome

This was a "true experimental design" in which random assignment of subjects to treatment conditions suffices to control for initial intergroup biases without a pretest, "within the limits of confidence stated by the tests of significance" (Campbell & Stanley, 1963, p. 25). Subject mortality, consisting of non-participating or only partially participating subjects whose data are not represented in the final analysis, can be a problem in this design, especially if there is differential mortality from the treatment groups. As indicated in Table 3.1 above, male students and osteopathic students were disproportionately overrepresented in the group which completed the project compared to the

group which did not complete it. Although the same approximate number of students in each group did not complete the project (five in Groups One and Three, and six in Group Two), this non-completing group included a disproportionately large number of females and allopathic medicine students. A diagrammatic representation of the experimental procedures is presented in Figure 3.2.

Treatment

Assignment to Experimental Conditions

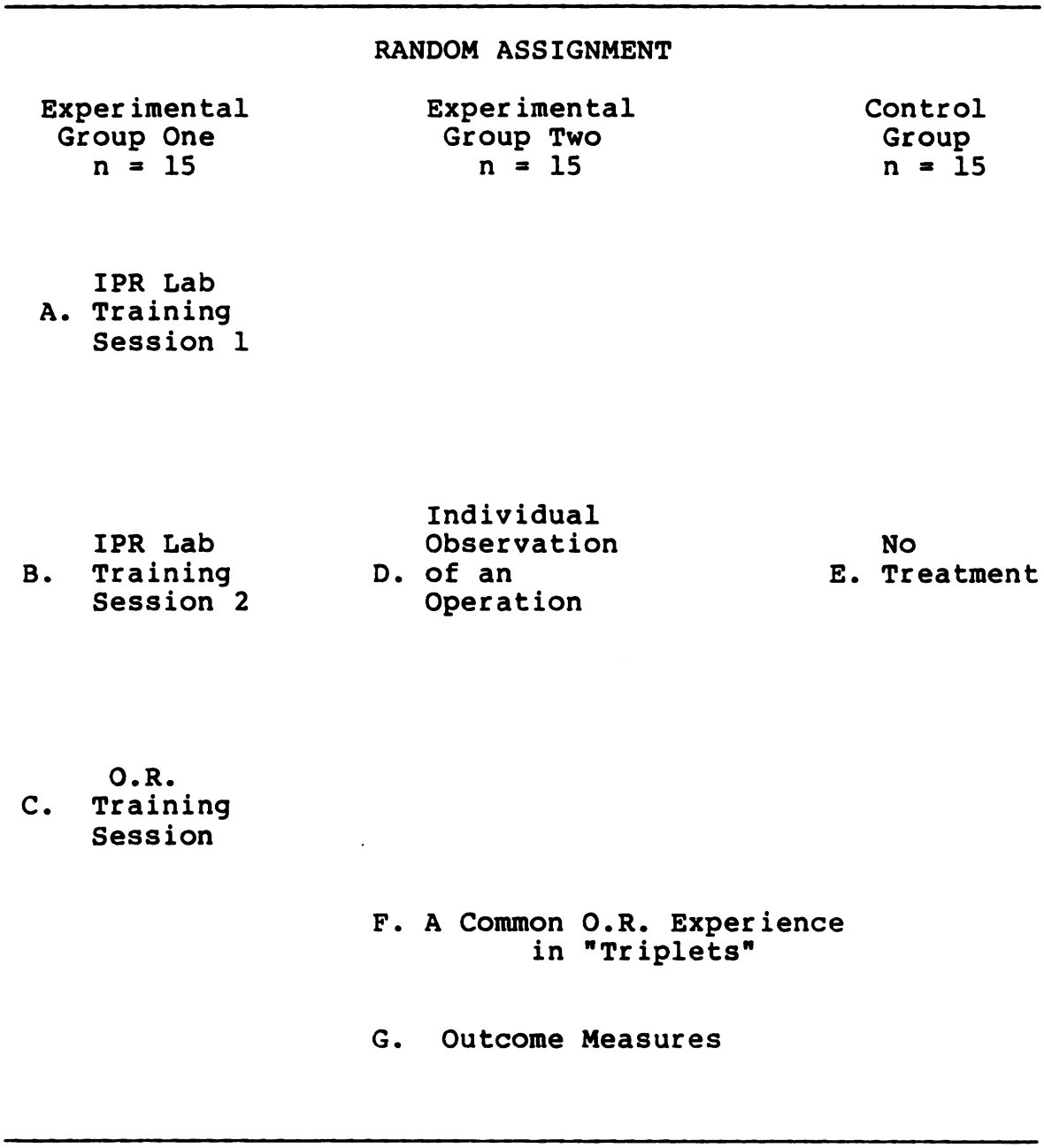
Based on their ranking by assigned experience scores, students were divided into three groups--high, medium and low experience. The members of each group were then randomly assigned, by means of a random numbers table to the two treatment conditions and the control condition. This method of assignment was intended to control the experience variable by using it as a blocking variable, but this arrangement was impossible to implement in the outcome phase of the project due to scheduling difficulties. It was frequently necessary to team up three students, one from each treatment group, from different experience groups. This necessitated the use of experience as a covariate in the data analysis rather than as a blocking variable.

Two-Phase Laboratory Experience

Introduction

The initial treatment portion of the study for Group One consisted of two sessions in the IPR Lab at Michigan

Figure 3.2: Diagram of Experimental Procedures

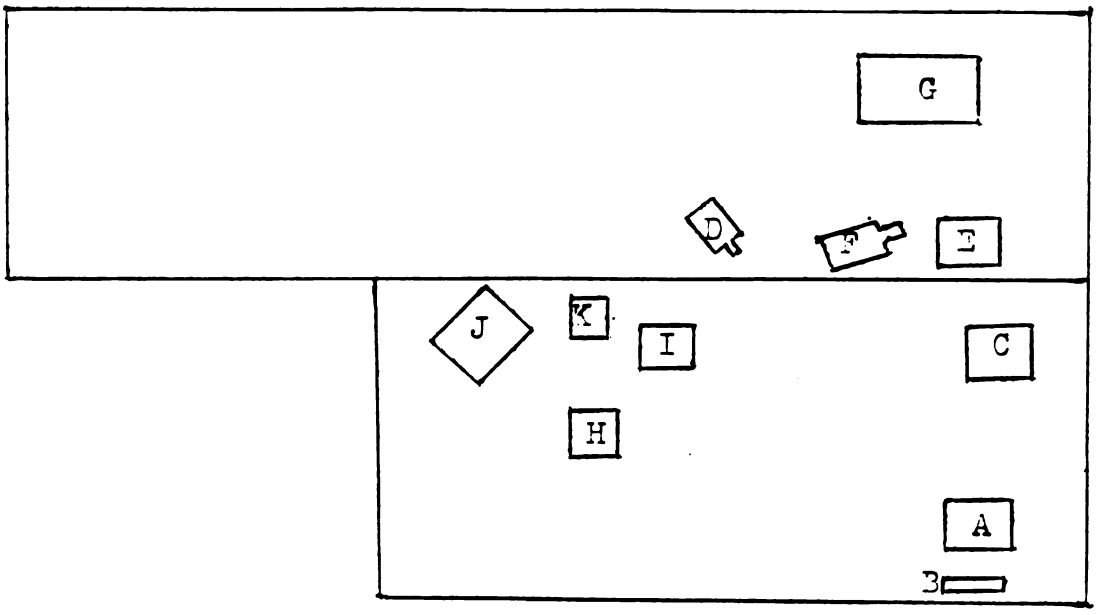


State University, each session lasting approximately one and a half hours. The students in the full-treatment group were scheduled for two sessions in the laboratory. The two sessions were normally scheduled about a week apart, but this time period varied from four days to two weeks. When the student arrived for his/her laboratory session, s/he was met by an inquirer. The inquirers in the project were three paid male counseling psychology doctoral students who had been trained in the I.P.R. method, the physiological wiring procedure, and the specific application of the I.P.R. method to this project. They followed standardized procedures outlined in Appendix C.

Physiological Wiring Procedure

The medical student was instructed to wash his/her hands and forearms with warm water and soap. This prepared the surface skin for the application of the electrodes to measure heart rate and skin conductance. The student was then seated in a specially wired chair in the subject room. The room temperature was maintained at 72^{o} - 74^{o}. The inquirer then briefly explained the laboratory procedures and proceeded to connect the student to the physiological recording devices. Figure 3.2 describes the floor plan of the I.P.R. Laboratory suite at M.S.U. A brief description of the electrode placement procedure and the physiological recording equipment and computer equipment follows.

Figure 3.3: Floor Plan of IPR Laboratory Suite



KEY

A. Subject seated here while viewing vignettes
B. Mirror reflecting vignette on C
C. Camera behind one-way mirror videotaping A and B while subject views vignettes
E. Grass model 7WC8PA strip chart recorder
F. Camera videotaping physiological readout
G. Videotape recorder and special effects generator
H. Inguirer seated here during recall
I. Subject seated here during recall
J. Split-screen monitor
K. Videotape recorder controlled by subject during recall

Two Beckman electrodes were placed on each arm, one electrode on the hypothenar eminence of the palm and one on the upper inner forearm. These electrodes measured skin conductance. Three pregelled disposable EKG electrodes were used to record heart rate expressed in beats per minute. One of these electrodes was placed on each inner wrist just above the hand. The third electrode was placed on the outside of the lower leg and functioned as a ground. The lead wires from these seven electrodes were inserted into an input connection box attached to the arm of the subject chair. Respiration was recorded by means of a rubber bellows placed around the student's chest. The bellows was linked by a rubber tube to a volumetric pressure transducer which fed an electrical signal into a Grass strip chart recorder (model 7WC8PA; Grass Instrument Co., Quincy, Mass.). A Hagfors Bridge (Hagfors, 1966) received the shin conductance signals and fed these into the Grass recorder. The Grass recorder also received signals from the heart rate electrodes and thus recorded the student's respiration, heart rate and skin conductance and printed these while the student watched the vignettes. A Digital PDP 11-34 computer recently added to the laboratory could be activated to sample and store incoming data from the Grass recorder. Because this interface was in an early stage of development in the laboratory, this computer sampling and storage could be done on only eleven students. Of these eleven, three did not complete the project. Of the eight students who did

complete the project, computer data were obtained for three vignettes for six of the students and for one and two vignettes respectively for the other two students.

Viewing of Vignettes

As the electrode attachment procedure was being completed by the inquirer, a second member of the research team calibrated the physiological recording devices which were housed in an adjacent room. The inquirer stayed in the subject room with the student until calibration was completed. The inquirer reminded the medical student to try to become as involved as possible with the vignettes and then left the subject room. The medical student was then shown the appropriate series of vignettes. The series of vignettes used in lab session one began with an introduction by the author, in which he encouraged the students to become as involved with the vignettes as possible. This first series consisted of twelve vignettes, and the second series, used in lab session two, consisted of eleven vignettes. Nine of these vignettes had been used originally in Embelton's 1979 study, while the remaining fourteen were produced specifically for the current study with a goal of producing more impactful content and better color reproduction. Eight of the twenty-three vignettes were interpersonal in nature, while fifteen were videotape segments of actual surgical procedures. Typescripts of these vignettes are found in Appendix D. The fourteen new vignettes were

produced by the technical supervisor of the project with a Sony video camera (Model DXC-1610) and Sony color videotape. Portions of these videotapes were spliced on a Sony Editing System (Model RM-400) to produce the two sets of vignettes. The vignettes varied in length from twelve seconds to five minutes, eighteen seconds, and were separated from one another by a twenty-second rest period.

While the student was watching the vignettes, a Sony video camera (Model AVC-3200) placed above the Grass recorder recorded the student's physiological responses to the vignettes. A remote-controlled marking device was used to distinguish the vignettes from the rest periods on the Grass recorder printout. While the first camera was recording the movement of the pens on the Grass recorder, a second camera, placed as inconspicuously as possible, recorded the student's face and upper body through a oneway mirror in the subject room. This camera also recorded the vignette which the student was watching by means of a mirror placed above and behind the student's head which reflected the vignette, as shown in Figure 3.3. The simultaneous inputs from each camera were filtered through a special effects generator allowing all three pieces of feedback information, the student watching the vignette, the vignette reflected in the mirror, and the physiological recording, to be recorded simultaneously on the same 1/2-inch Sony recording tape for use during the recall.

Recall

In the first laboratory session, the student watched the first four vignettes of the first series. An IPR recall of the student's responses to these vignettes was then conducted by one of the inquirers in order to familiarize the student with the recall process. The student was asked to recall and discuss cognitive, emotional and physiological reactions to the vignettes. The paper readout from the Grass recorder was used to facilitate the recall process. The student viewed the videotape on the playback monitor in the subject room. The right half of the screen displayed the physiological record as it was unfolding, and the left displayed the student's face while watching the vignette as well as the vignette itself, reflected in the mirror over the student's head. The student was encouraged to stop the tape whenever desired, but especially at the end of each vignette, to discuss personal reactions. The open, exploratory, student-controlled atmosphere of the IPR recall was maintained. This "mini-recall," after the first four vignettes of the first series, was built into the design to familiarize all the students with the recall process, but it was especially geared to the needs of the osteopathic students. College of Human Medicine students had already had an IPR-based doctor-patient relationship course and were at least familiar with audiotape recalls, if not with the videotape method used in the laboratory. The osteopathic students had not had this prior exposure to IPR, however,

and it was felt that the "mini-recall" would be especially helpful to them in gaining as much as possible from the recall process. Following the mini-recall, the inquirer left the subject room, the medical student watched the remainder of the vignettes, and a recall of the student's reactions to these later vignettes was then conducted.

Instructional Component

The second session of the two-phase laboratory experience was similar to the first except that the second series of vignettes was used and the student viewed a short instructional videotape at the end of the session. This instructional component was added to the treatment on the basis of a possible interpretation of Embelton's non-significant results. It is possible that through the IPR lab sessions Embelton's medical students became more aware of their reactions but still felt a lack of control over them. This felt lack of control may have interfered with their observational performance in the operating room. The addition of an instructional videotape offering concrete suggestions on coping with reactions to unpleasant stimuli in the O.R. would perhaps address the need for control over the reactions which the student experienced. The videotape used was narrated by the Director of Surgical Education at M.S.U. and was excerpted from a videotape entitled Learning on the Surgical Clerkship--in the O.R. (Doran, Cochran, English, Alexander, 1979). The typescript of the segment

used in the study is found in Appendix E.

Hospital Experience

Introduction

The arrangement of the hospital experience phase of the project involved extensive contact with medical students, surgeons and O.R. personnel, especially in the scheduling of students to be videotaped in the O.R. and scheduling of students to observe operations. The technical supervisor of the project, a surgical orderly and doctoral student in biology, was instrumental in the successful accomplishment of this phase of the project.

Approval to conduct the hospital phase was sought from four hospitals in the Lansing area. Two hospitals did not approve, one indicated concern for patient safety with the use of videotaping equipment in the O.R. Of the two hospitals which approved, one did not approve until late in the outcome phase of the project, and it was judged impractical at that point to incorporate a new experimental site. The entire hospital phase of the study, therefore, was conducted at Ingham Medical Center in Lansing. Ingham Medical Center is a community-oriented, non-profit teaching hospital with 700-plus beds. The multiple-specialty surgical suite has eight operating rooms, six of which are similarly equipped. The other two can function as general purpose O.R.s but are also specially equipped for heart surgery.

To enlist the cooperation and participation of surgeons in the project, Dr. Edward Coppola sent letters to several area surgeons who practice at Ingham Medical Center (Appendix F). Eighteen surgeons participated, allowing medical students to observe and/or be videotaped in the O.R. These surgeons did not know the specific purpose of the research. Some interacted with the students more than others. Level of interaction ranged from one surgeon who spent time showing the patient's x-ray to the students and discussing the case to surgeons who said little to the students. The employment in the outcome phase of the project of "triplets"--groups of three students, one from each group--was partly an attempt to control for this surgeon variability.

Three distinct experimental procedures were conducted at the hospital. The first of these involved the third treatment experience for Group One students following their two laboratory sessions. Along with the instructional videotape at the end of the second laboratory session, this initial hospital experience comprised a significant addition to Embelton's treatment. This addition consisted of videotaping and conducting a recall of the Group One student's reactions to his/her first O.R. observational experience in the project.

Group One Recall of Observation of Operation

The following standardized procedure was followed in arranging and implementing this first hospital treatment

experience of Group One students in the O.R.

1. Operating room schedules were obtained from the O.R. head nurse as far in advance as possible. The day's schedule was usually printed the preceding afternoon, sometimes on Friday for Monday.

2. The technical supervisor of the project and the author chose possible operations to be used on the basis of six criteria: (1) surgeon cooperativeness; (2) probable use of general anesthesia; (3) a significant incision; (4) probable length in time of one to two hours; (5) probability of patient willingness to sign the release form for videotaping (slight, for example, in hysterectomy and mastectomy cases); and (6) relatively low probability of patient mortality.

3. The technical supervisor approached patients and asked them to sign release forms for videotaping (Appendix G). In most cases, patients were very cooperative.

4. The author maintained periodic telephone contact with medical students to keep updated on their summer schedules. Students who might be available on a given day were called to confirm a time to be videotaped in the O.R. and to have a recall of their reactions following their observation of the surgery. As the project progressed and it became clear that experimentally appropriate operations would be quite readily available, students frequently specified a good day in advance and were then notified the evening prior to their day of the exact time of the surgery they would observe. Students were asked to arrive in the surgical suite one-half hour before the scheduled start of the surgery.

5. When the student arrived at the surgical suite, s/he was met by the author and the technical supervisor and shown to the locker room to obtain surgical attire ("scrub suit" consisting of cap, shirt, pants, mask, and shoe covers). The student changed and was then given brief instructions regarding sterile procedures in the O.R. The student was told the surgeon's name, the patient's age and sex, and the nature of the procedure to be performed. The student was instructed to observe and did not "scrub in."

6. The technical supervisor got confirmation from the scheduled surgeon for the student to observe the first part of the operation and for videotaping.

7. The student observed the first half hour of the operation, usually entering the O.R. just prior to the insertion of the endotracheal tube and the induction of anesthesia. This enabled the student to view those aspects of surgery consistently identified by students in the Coppola-Cochran survey and in Embelton's study as the most tension-producing: the induction of anesthesia, final prepping of the patient, the incision, and at least the initial portion of the surgery itself. The basic rule followed in placement of the student in the O.R. was that the student should get the best vantage point possible while avoiding sterile areas. Surgeons frequently cooperated in giving the student the best possible view.

8. The technical supervisor videotaped the student the O.R. and the surgical procedure for about 1/2 hour using a Sony color camera (Model DXC-1610) and a cassette videotape recording deck. This equipment was wiped with an antiseptic solution prior to its use in the O.R.

9. The student then left the O.R. and was met by one of the three inquirers employed in the study. An attempt was made to arrange schedules so that a given student had the same inquirer for all three recalls, the two in the laboratory and the one in the hospital, though this was not possible in all cases. In most cases, after the medical student had changed back into his/her street clothes, the inquirer and the student carried the videotape cassette to the Michigan State University Clinic in the Professional Building of Ingham Medical Center and conducted the recall in one of the examining rooms there using a Sony color monitor and a cassette videotape recorder. In two cases, scheduling did not permit the recall to be held immediately following the videotaping. In both of these cases the recall was conducted in the IPR laboratory at M.S.U., one later on the same day and one three days later.

Group Two Observation of Operation.

The second experimental procedure conducted at the hospital was the observation of an entire operation by each

Group Two student. Nineteen Group Two students observed operations. At the beginning of the hospital phase, the investigator was uncertain about how easily accessible operations would be. Since the number of operations might be limited, it was initially decided to schedule pairs of Group Two students to observe operations together. This was done with the first two operations. It then became apparent that accessibility to operations would make it possible to schedule students to observe singly, and this was done thereafter. In almost all cases, the investigator and/or the technical supervisor were in the O.R. to note any significant anecdotal data.

Standardized procedures similar to those outlined above for Group One students were carried out in arranging these experiences for Group Two students, except that Group Two students observed for a longer time, were not videotaped, and had no recall. Observation times for Group Two students averaged one hour nineteen minutes, ranging from forty-five minutes to two and one-half hours. The experimental goal had been to have students observe for about one and one-half hours, but some surgical procedures were longer and some were shorter. In one case, a Group Two student, after observing an operation for one hour, on his own initiative asked a surgeon if he could observe a heart operation which had just begun. The surgeon agreed, and the student observed the operation for six hours. This time period was not included in the computation of the average observation

time.

The primary reason for the inclusion of Group Two in the present study was the anticipation of an alternative explanation of significant results if these were found. Had Embelton found significant differences between his groups in the hypothesized direction, a possible explanation would have been the fact that the full-treatment group had prior surgical experience of a sort in viewing the surgical vignettes, and that this additional experience might have improved their performance regardless of the recall, the essence of the IPR model. The inclusion of a second treatment group which observed an actual operation was an attempt to avoid this competing hypotheses. Although total treatment time for Groups One and Two varied from an average of four hours for Group One to an average of about one and one-half hours for Group Two, Group Two nonetheless did have more surgical observation time than Group One prior to the outcome phase of the study (one and one-half hours compared to one-half hour for Group One). The use of a control group in this study served the same purpose as it had in Embelton's study, that of representing the current reality of the medical school curriculum in which there is no formal provision for surgical experience prior to the surgical clerkship.

O.R. Observation by "Triplets"

The third experimental procedure conducted at the hospital consisted of sets of three students ("triplets"),

one from each group, observing an operation together and then responding to the outcome measures. As more and more students completed this final phase of the project and the available student pool decreased, it became increasingly difficult to synchronize schedules to obtain new triplets. This was the primary reason why fifteen students in each group completed the project when there had originally been at least twenty students in each group. Attempts were made throughout the fall of 1980 to assemble more triplets, but this could be done only on Saturdays in most cases due to student class schedules, and there was usually only a light O.R. schedule of emergency operations on Saturdays, if any.

The three students in a triplet were instructed to arrive at the hospital one-half hour prior to the scheduled start of surgery and to wait in the main lobby of the hospital. The students were met there by the investigator and given an instruction sheet (Appendix H) outlining the procedure to be followed. The students then changed into scrub suits and entered the O.R. just prior to the patient's entry.

They remained in the O.R. until the surgery was completed. The technical supervisor was in the O.R. in all these cases in order to record the correct answers to the Operating Room Experience questionnaire for each surgical procedure for use in correcting the students' questionnaires. The investigator was also present in most cases to record anecdotal data, to insure independent observation,

and to assure that each student had equal opportunity for observation. The goal had been to have these triplets observe an entire operation lasting about one and one-half hours. Due to the relative unpredictability of time in surgical procedures, actual observation times ranged from forty minutes to one hour thirty-five minutes, the mean time being slightly over one hour. One student in the second triplet was late in arriving at the hospital, so this triplet observed the last part of the scheduled operation and the beginning of another. When this triplet completed the outcome measures, the author indicated which questions on the Operating Room Experience questionnaire they should answer for the first operation and which for the second. The students left the O.R. following the operation, changed clothes and proceeded with the author to a conference room in the hospital to complete the outcome measures. In two cases this was done in a quiet area of the hospital library. All triplets completed the outcome measures in thirty to forty minutes. This completed the treatment and outcome phases of the project.

Instrumentation

Introduction

Eight outcome measures were used in this study. They were:

1. State-Trait Anxiety Inventory (STAI Form X-1)
2. Operating Room Experience questionnaire (ORE)

3. Apprehension to Surgical Procedures Questionnaire (ASPQ Form E)
4. "Surgeon" Semantic Differential
5. "Myself in the O.R." Semantic Differential
6. Specialty Questionnaire
7. "Self" Semantic Differential
8. Impression Paragraph

Copies of these measures are found in Appendix I. These measures were divided into the following five dependent variable groupings:

1. Measures of Emotional/Physiological Reactivity
   a. State-Trait Anxiety Inventory
   b. Apprehension to Surgical Procedures Questionnaire
2. Learning (Observation) Measure
   a. Operating Room Experience Questionaire
3. Attitudinal Measures
   a. "Surgeon" Semantic Differential
   b. "Myself in the O.R." Semantic Differential
   C. "Self" Semantic Differential
4. Medical Specialty Questionnaire
5. Impression Paragraph

Each grouping will be discussed below, with specific reference to the individual measures within each group.

Measures of Emotional/Physiological Reactivity

The state form of the State-Trait Anxiety Inventory (A-State, Form X-1; Spielberger, Gorsuch, Lushene, 1970) was

used to measure the general level of state anxiety which medical students experienced in the O.R. This measure operationalized anxiety as a dual concept including both trait anxiety, which refers to relatively stable individual differences in anxiety proneness, and state anxiety, which refers to a transitory emotional state or condition characterized by subjective, consciously perceived feelings of tension and apprehension and heightened autonomic nervous system activity. Only the state form of the inventory was used in this study, since the primary issue was the experience of anxiety by the students in the O.R. rather than their experience of anxiety in general. The instructions on the form were modified, in accordance with suggestions in the test manual, to pertain to the time when the student was in the O.R. Several items were also changed to past tense. The STAI was the only standardized instrument used in the study. The validity of the STAI was developed over a six-year period with seven different samples of undergraduates. The test is highly correlated with other standard measures of state and trait anxiety (Spielberger et al., 1970). Since anxiety states are by definition transitory in nature, internal consistency measures of reliability are more meaningful than test-retest measures. Spielberger et al. (1970) reported Cronbach alpha coefficients ranging from .83 to .92 for the STAI Form X-1, indicating sufficient internal consistency. The computed alpha reliability coefficient for the STAI in the present study was .813. Higher anxiety was

indicated by higher scores on the STAI.

A measurement of medical students' reactions to specific stimuli in the operating room was obtained by the Apprehension to Surgical Procedures Questionnaire (ASPQ, Form E). This questionnaire was adapted from the form used by Embelton and originally developed by Coppola and Cochran to assess medical student reactions to specific stimuli in the operating room during their surgical clerkships. The present form obtained information about the nature, extent, intensity, and duration of unpleasant physiological and emotional reactions which the student may have experienced in the O.R., as well as methods the student used to cope with these reactions. The questionnaire also asked students to identify specific stimuli to which they were physically and/or emotionally sensitive while they were in the operating room. Students were asked to check one of the following categories for each of 36 specific stimulus items: "Didn't bother me," "Bothered me a little," "Bothered me a lot," and "Does not apply." The allocation of points was done as follows:

Didn't bother me = 0

Bothered me a little = 1

Bothered me a lot = 2

Does not apply = 0

A total score and an average score, based on the number of items which the student indicated were bothersome, were computed for each student and yielded an index of the

student's reactions to the operation observed.

Learning (Observation) Measure

Rather than attempting to measure learning in a broad sense, the present study attempted to assess a specific component of the learning process, that of observation. Devising a suitable instrument for this purpose was complicated by the fact that different sets of students ("triplets") observed different operations. Coppola, Embelton and Cochran (1979) encountered the same problem in Embelton's study, and constructed an instrument called the Operating Room Experience inventory (O.R.E.). The O.R.E. asked fifteen questions of the medical student, fourteen of which were short answer and one of which was multiple choice in nature. In Embelton's study, the operating surgeon decided which of the two students who had observed his operation did better on the O.R.E. In the present study, the O.R.E. was adapted in an attempt to increase its objectivity and standardization across operations and its face validity. Questions were stated in a "yes-no" or multiple choice format whenever possible. This format comprised eight of the questions in the final form. The remaining twelve questions required single number or short written answers. An attempt was made to minimize the possibility of a positive bias toward better writers among the medical students. The O.R.E. includes questions about patient and surgeon characteristics, specific surgical

procedures, instruments and equipment, anatomy and O.R. staff. The face validity of the instrument was evaluated by three academic surgeons at Michigan State University not connected with the study, and they agreed that a medical student scoring 80% on the questionnaire would have been "very observant in the O.R." Increasing the number of items from fifteen in Embelton's study to twenty in the present study increased the potential variability of scores, although Embelton used only dichotomous scores anyway (a one or two, based on the surgeon's rating of which student had performed better). In an attempt to utilize this increased variability and increase the chance of finding intergroup differences, the three O.R.E.s completed by the different triplets observing operations were scored blindly by the technical supervisor of the project based on her completed O.R.E. for each of these operations. These scores were used in the analysis as indices of the medical students' observational skill during the operation.

Attitudinal Measures

The attempt in the present study to measure attitudes of medical students was a result of two factors: (1) the possible relationship between medical students' unpleasant reactions to operating room stimuli and their attitudes toward surgeons and surgery; and (2) the possibility that attitudinal differences between the three groups existed despite a lack of significant results on the State Anxiety

Inventory and the Operating Room Experience Inventory. These latter possible differences pertained to medical students' perceptions of and attitudes toward themselves in general and themselves in the operating room. These differences do not always manifest themselves on the State Anxiety Inventory or the Operating Room Experience Inventory, but might be a subtle yet measurable effect of the self-scrutiny and self-awareness fostered in the IPR recall process, both in general and in relation to surgery. Three attitudinal measures were therefore incorporated into the present study to attempt to uncover any such differences that might exist among the groups.

The type of instrument chosen to explore this area was the semantic differential (Osgood, Suci, & Tannenbaum, 1957). In addition to possessing a good research record of measuring attitudes and attitudinal change (Osgood, et al.; 1957; Staats & Staats, 1958; Tannenbaum, 1966; Williams, 1966), the semantic differential offered ease of administration, scoring and analysis. The essence of a semantic differential instrument is the juxtaposition of words, usually adjectives, with polar meanings to which the subject is asked to respond by indicating the degree to which s/he feels a given concept is related to one or the other word, e.g.:

	very closely related	quite closely related	only slightly related	neutral or equally associated	only slightly related	quite closely related	very closely related	
KIND								CRUEL

The first step in constructing semantic differential

instruments was to select the concepts which would be rated with the bipolar adjectives. In the present study, as stated above, the medical students' attitudes which were of interest were those toward: (1) surgeons and surgery; (2) the medical student him/herself in general; and (3) the medical student in the operating room. Semantic differential instruments were therefore devised to explore these three conceptual areas.

The "Surgeon" semantic differential was intended to explore differences among the three groups in their attitudes toward surgeons following the treatment administered to the two treatment groups. This research question grew out of the notion that a self-selection process of career interest and selection might be operating in medical students in relation to surgery. Specifically, it might be that medical students' experiences of unpleasant physiological and emotional reactions to surgery might influence them to conclude that they were not "cut out" to be surgeons. In addition, these reactions might subtly promote a somewhat negative stereotype of the surgeon as a cold, insensitive technician on the basis of a possible belief that only such a person could be unaffected by the stimuli experienced as noxious by the medical student. If significant differences appeared on the State Anxiety Inventory, the Operating Room Experience Inventory or the Apprehension to Surgical Procedures Questionnaire, therefore, it might be predicted that similar differences

relating to a more positive or negative attitude toward surgeons and surgery might also exist. The "Surgeon" semantic differential was devised to explore this question. "Surgeon," rather than "surgery," was chosen as the concept to be rated by the medical students because it was felt that the application of adjectives to the noun surgeon would be more easily understood by the students than the application of the chosen pairs of adjectives to the act of operating. These concepts were quite obviously related, and Tannenbaum (1966) showed that if the attitude of a group toward one concept was changed, attitudes toward linked or related concepts would be changed in the same direction. The construction of the "Surgeon" semantic differential began with the circulation of ninety adjective pairs to Edward Coppola, M.D., Professor of Surgery at M.S.U.; Norman Kagan, Ph.D., Professor of Counseling Psychology and of Psychiatry at M.S.U.; and Teresa Cochran, Ph.D., Director of Surgical Education at M.S.U. The pairs of bipolar adjectives were drawn from Osgood et al. (1957), a list that Coppola and Cochran had devised, and some pairs added by the author. Osgood's pairs included several which had shown loadings on factors named evaluation, potency and activity in previous research (Osgood et al., 1957). Coppola, Kagan and Cochran were asked individually to choose twenty-five adjective pairs which they thought met the following criteria:

(1) understandable by the medical student in the project with the lowest vocabulary level

(2) relevant to the concept "surgeon" and to the

hypothesized difference among the three groups, i.e., that the full-treatment group would have a more positive concept of surgeons

(3) likely to discriminate among students and groups, i.e., that students would be apt to score it differently, thereby increasing the likelihood of finding differences if they existed

Based on these choices, a list of twenty-one adjective pairs was compiled to be used in the "Surgeon" semantic differential. When each triplet completed this outcome measure following their observation of an operation, they were reminded that they were to rate their concept of surgeons in general, rather than the surgeon whom they had just observed.

Two distinct semantic differentials were used to assess medical students' attitudes toward themselves. One of these assessed the student's attitude toward him/herself in general and the other assessed the student's attitude toward him/herself during the time in the operating room. The first of these two measures consisted of the same adjectival pairs used in the "Surgeon" semantic differential and attempted to assess both general self-perception differences among the groups and similarities between students' attitudes toward surgeons and attitudes toward themselves. The second of these two "Self" semantic differentials, which attempted to assess the student's attitude toward him/herself during the time s/he was in the operating room, was based on the hypothesis that even if significant differences were not found in the anxiety and learning

measures, there might nonetheless be subtle differences in self-perception while in the O.R. In order to develop a good list of bipolar adjectives to explore this question, a list of ninety adjectives was circulated to the three counseling psychology doctoral students who were employed as inquirers in the project as well as to J. Bruce Burke, Ph.D., Professor in the College of Education at M.S.U. These people were familiar both with the recall process and with the content of the recalls of the medical students in the project. It was felt that consultation with these people would yield adjective pairs which might tap a subtle yet real difference in self-perception while in the O.R. among the three groups of students, a difference perhaps influenced by the self-scrutiny and increased self-awareness fostered by the IPR recall. The ninety-adjective list was reduced to thirty-two and recirculated to the above persons, yielding a final list of eleven adjectives. These adjectives were paired with their opposites to create the final measure. In each semantic differential, adjective pairs were randomly reversed to avoid response bias.

Medical Specialty Questionnaire

The Medical Specialty Questionnaire was devised to obtain information about the medical student's planned specialty, degree of certainty about that specialty, and the student's ranking of the relative attractiveness of eight medical specialties. The primary piece of datum yielded by

this form was the ranking of the attractiveness of surgery as a career specialty.

Impression Paragraph

The Impression Paragraph asked the medical student to describe in twenty-five words or less what impressed him/her about the operating room experience just completed. Analysis of these paragraphs consisted of group comparisons on three frequencies:

(1) a word frequency

(2) a frequency of the first-person personal pronouns "I" and "Me"

(3) a frequency of the number of affective statements, defined as phrases or clauses including one or more affective terms

The word frequency yielded a global index of self-expression in this specific situation (following observation of an operation). The I-ME frequency yielded an index of self-referenced expression. The affective statement frequency, tabulated by two members of the NIMH research team, provided an index of affective content. The alpha reliability coefficient for the two affective statement frequencies was .97. It was felt that one or more of these frequencies might show a difference among the three groups which might not display itself on any of the other measures.

Interim Observation Form

After completing the eight outcome measures, each medical student completed an Interim Observation Form (Appendix J) which obtained information regarding any surgical experience the student may have gained outside the project since the beginning of the project. This form followed the format of the participation form used at the beginning of the project. The "experience score" obtained from the Interim Observation Form was added to the student's original experience score to yield a single experience score to be used as a covariate in the data analysis.

Analysis

Although a two-way analysis of variance, crossing treatment and experience, was originally planned, the use of experience as an independent variable proved impossible due to the realities of scheduling. It was therefore decided to use experience as a covariate. Preliminary one-way analyses of variance were performed for all eight outcome measures, including analyses of the individual scales on the three semantic differentials. Chi-square analyses were also done, as well as two non-parametric tests, median and Kruskal-Wallis one-way ANOVA, on the surgery ranking. If some outcome measures had proven to be highly correlated (e.g., the semantic differentials) these would have been grouped together in a multivariate analysis of variance. Significant results were not obtained, therefore multivariate analysis was not required.

Experimental Hypotheses

I. H_o: There will be no significant differences among the three groups on the State Anxiety Inventory.

H_1: Group one will score significantly lower on the STAI than Groups Two and Three.

II. H_o: There will be no significant differences among the three groups on the Operating Room Experience Inventory.

H_1: Group one will score significantly higher on the O.R.E. inventory than Groups Two and Three.

III. H_o: There will be no significant differences among the three groups on the Apprehension to Surgical Procedures Questionnaire.

H_1: Group one will score significantly lower on the A.S.P.Q. than Groups Two and Three.

IV. H_o: There will be no significant differences among the three groups on the "Surgeon," "Self," and "Myself in the O.R." semantic differential scales.

H_1: Group one will score significantly higher, i.e., rate the concepts more positively, on the "Surgeon," "Self," and "Myself in the O.R." semantic differential scales than Groups Two and Three.

V. H_o: There will be no significant differences among the three groups in their ranking of the attractiveness of surgery as a career specialty.

H_1: Group one will rank surgery significantly higher in attractiveness as a career specialty than Groups Two and Three.

VI. H_o: There will be no significant differences among the three groups in the word frequency, first-person personal pronoun frequency, and affective statement frequency in the Impression Paragraph.

H_1: Group one will score significantly higher on word frequency, first-person personal pronoun frequency, and affective statement frequency in the Impression Paragraph than Groups Two

and Three.

Delimitations

I. No measures of physiological responsiveness were taken while the medical students were in the operating room due to technological and space limitations.

II. No attempt was made to follow this group of medical students to determine which students did in fact enter surgery as a career specialty.

CHAPTER IV

RESULTS

Introduction

The results of the data analysis are presented in the same format as the categories of outcome measures outlined in Chapter Three. The dependent variables, the instruments used to measure them, and the hypotheses to which they pertain are identified below:

Dependent Variables	Outcome Measures	Hypotheses
1. Emotional-Physiological Reactivity	STAI, ASPQ	I, III
2. Learning (Observation)	ORE	II
3. Attitudes	"Surgeon," "Myself in the O.R.," and "Self" Semantic Differentials	IV
4. Surgery Ranking	Medical Specialty Questionnaire	V
5. Impressions	Impression Paragraph (word frequency, I-ME frequency, affective statement frequency)	VI

Appendix I contains copies of the measures.

Analysis of variance (ANOVA) was used as the primary statistical analysis for each outcome measure. ANOVA was the appropriate statistical procedure because it allows comparison of means of two or more groups. The conventional .05 alpha level was used. One-tailed significance tests were used because it was expected that results would lie in the upper or lower half of the distribution, depending on the outcome measure. The degrees of freedom for the ANOVAs in this study were 2 between groups (number of groups minus 1) and 42 within groups (number of subjects minus number of groups). One exception was the surgery specialty ranking, in which two students did not rank all the specialty areas. This resulted in 2 and 40 degrees of freedom respectively.

Chi-square analysis was used on the surgery ranking and on each item of the three semantic differential scales. Chi-square was appropriate because the scores on these scales are categorical rather than continuous in nature; chi-square relies upon categorical data. The chi-square statistic has degrees of freedom equal to (rows minus 1) (columns minus 1). This varied depending on the number of categories checked by the students on the semantic differential items.

Two non-parametric tests of significance, the Kruskal-Wallis one-way ANOVA and the chi-square median test, were used on the surgery ranking outcome measure. These tests are better suited to rank-order data than are parametric

tests and do not require assumptions of normality and equality of variance (homoscedasticity).

The means and standard deviations for the various measures are provided in Table 4-1, the ANOVAs are summarized in Table 4-2, and the additional tests on the surgery ranking are summarized in Table 4-3.

The remainder of this chapter contains sections on each of the five dependent variables described earlier. Each section includes a statement of the pertinent hypothesis-(es), a description of the scoring of the measure(s), and a statement of the results. The hypotheses are preceded by the Roman numerals used in Chapter Three.

Emotional-Physiological Reactivity

Hypotheses

I. Group One will score significantly lower on the State Anxiety Inventory (STAI) than Groups Two and Three.

III. Group One will score significantly lower on the Apprehension to Surgical Procedures Questionnaire (ASPQ) Checklist than Groups Two and Three.

Scoring of Measures

The STAI consisted of twenty items of the following type:

I felt calm . . .

I was tense . . .

Student responses on the STAI were scored, as stated in the

test manual (Spielberger et al., 1970), as follows: Not at all = 1; Somewhat = 2; Moderately so = 3; and Very much so = 4. Scores in the study ranged from 23 to 54. A higher score indicated a higher level of state anxiety (e.g., the highest possible score of 80 would signify a very high state anxiety level). To reduce response bias on the part of the subjects, ten items are scored directly and ten are reversed.

The ASPQ Checklist contained thirty-six stimulus items of the following type:

incision

helplessness of patient

Students responded by indicating the degree to which they were bothered by the various stimuli. Their responses were scored: Didn't bother me = 0; Bothered me a little = 1; Bothered me a lot = 2; Does not apply = 0. The possible range of scores was 0 to 72. Higher scores were associated with higher levels of responsiveness to surgical stimuli.

Results

Means and standard deviations are presented for each group in Table 4.1 and a summary of the ANOVAs in Table 4.2. No significant differences were found.

Learning (Observation)

Hypothesis

II. Group One will score significantly higher on the Operating Room Experience (ORE) Inventory than Groups Two and Three.

Scoring of Measure

A maximum score of 37.5 on the ORE indicated a very high degree of accurate observation. Correct answers on yes-no, multiple choice, and questions requiring a single-number answer were awarded one point each. The answers to questions requiring short written answers earned from two to six points based on the extent and accuracy of the response.

Results

The three groups did not differ significantly on the Operating Room Experience Inventory. Means, standard deviations and the ANOVA summary are presented in Tables 4.1 and 4.2.

Attitudes

Hypothesis

IV. Group One will score significantly higher, i.e., rate the concepts more positively, on the "Surgeon," "Self," and "Myself in the O.R." semantic differentials than Groups Two and Three.

Scoring of Measures

Students responded to sets of bipolar adjectives like sensitive-insensitive and impulsive-thoughtful by indicating how closely related they felt one or the other adjective was to the concept being rated. The Surgeon and Self semantic differential scales were scored as follows: Very closely related (to the positive polar adjective) = 7; Quite closely related = 6; Only slightly related = 5; Neutral or equally associated = 4; Only slightly related (to the negative polar adjective) = 3; Quite closely related = 2; Very closely related = 1. On the "Myself in the O.R." scale, the middle neutral category was eliminated and a forced-choice format was used.

An average score was computed for each student on each measure. Average scores were used rather than total scores to compensate for items skipped. Possible range of scores was 1 to 7 on the "Surgeon" and "Self" measures and 1 to 6 on "Myself in the O.R." Higher scores indicated more positive rating of the concept. Items on which the positive-negative dimension was unclear or highly subjective were deleted from the analysis.

Results

There were no significant differences among the three groups on the "Surgeon," "Myself in the O.R.," and "Self" semantic differentials, either in average scores or in individual item analysis. Students chose the same

adjectives to describe themselves and surgeons in all cases but two. Students described surgeons as egotistic and arrogant and themselves as correspondingly altruistic and humble. Means and ANOVAs are presented in Tables 4.1 and 4.2, respectively.

Specialty Rankings

Hypothesis

V. Group One will rank surgery significantly higher in attractiveness as a career specialty than Groups Two and Three.

Scoring of Measure

Each student ranked the attractiveness of surgery as a career specialty in a list of eight specialties. The highest rank was 1; the lowest was 8. Two students, one in Group Two and one in Group Three, did not rank all eight specialties. Their scores were deleted from the final analysis. In addition to analysis of variance and chi-square analysis, two non-parametric tests were done on the surgery ranking, a median test and a Kruskal-Wallis one-way ANOVA.

Results

Although the surgery rankings of the three groups were in the hypothesized direction, i.e., Group One ranked surgery higher than Groups Two and Three, the analysis of variance and the two non-parametric tests did not show

significant differences among the groups. The chi-square analysis showed the differences to be significant at the .06 level. This result should be interpreted with caution, however, because several of the chi-square cells had fewer than five cases. Surgery ranking means and the ANOVA are presented in Tables 4.1 and 4.2. The chi-square analysis and the results of the non-parametric tests are presented in Table 4.3.

Impressions

Hypothesis

VI. Group One will score significantly higher on word frequency, first-person personal pronoun frequency, and affective statement frequency in the Impression Paragraph than Groups Two and Three.

Scoring of Measure

The word frequency and the I-ME frequency were simple totals of the number of words and of first-person personal pronouns. A frequency of affective statements was done by each of two raters who were part of the research team. Consensus was reached on the definition of "affective statement" as any phrase or clause containing one or more affective terms. Analysis of variance was performed on these frequencies.

Results

No significant differences were found among the three groups on the word frequency, first-personal personal pronoun frequency, or affective statement frequency. Means and ANOVAs are presented in Tables 4.1 and 4.2, respectively.

Table 4.1. Means and Standard Deviations

Outcome Measure	Mean	Standard Deviation	N
1. State Anxiety Inventory (STAI)			
Group One	32.40	5.59	15
Group Two	31.07	4.30	15
Group Three	35.07	8.15	15
2. Apprenhension to Surgical Procedures Questionnaire (ASPQ) Checklist			
Group One	3.87	4.45	15
Group Two	3.53	2.39	15
Group Three	4.53	4.31	15
3. Operating Room Experience Inventory (ORE)			
Group One	27.80	4.11	15
Group Two	27.93	3.83	15
Group Three	29.40	2.75	15
4. "Surgeon" Semantic Differential			
Group One	3.18	.86	15
Group Two	2.97	.77	15
Group Three	3.25	.95	15
5. "Myself in the O.R." Semantic Differential			
Group One	2.19	.53	15
Group Two	1.99	.42	15
Group Three	2.16	.55	15
6. "Self" Semantic Differential			
Group One	2.63	.45	15
Group Two	2.32	.50	15
Group Three	2.26	.73	15
7. Medical Specialty Questionnaire (Surgery Ranking)			
Group One	3.73	1.53	15
Group Two	3.93	2.23	14
Group Three	4.71	2.16	14

Table 4.1. Means and Standard Deviations (cont'd)

Outcome Measure	Mean	Standard Deviation	N
8. Impression Paragraph:			
Word Frequency:			
Group One	33.33	25.26	15
Group Two	31.00	18.17	15
Group Three	28.00	16.77	15
I-ME Frequency:			
Group One	1.20	1.74	15
Group Two	1.67	2.23	15
Group Three	1.13	1.51	15
Affective Statement Frequency:			
Rater One			
Group One	1.13	1.25	15
Group Two	1.07	1.33	15
Group Three	.87	1.13	15
Rater Two			
Group One	.93	1.33	15
Group Two	.80	1.08	15
Group Three	.80	1.21	15

Table 4.2. Summary of Analysis of Variance

Outcome Measures	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio
1. State Anxiety Inventory (STAI)				
Between	124.44	2	62.22	1.61
Within	1627.27	42	38.75	
2. Apprehension to Surgical Procedures Questionnaire (ASPQ) Checklist				
Between	7.78	2	3.89	.26
Within	617.20	42	14.70	
3. Operating Room Experience Inventory (ORE)				
Between	23.64	2	11.82	.91
Within	546.93	42	13.02	
4. "Surgeon" Semantic Differential				
Between	.63	2	.31	.42
Within	31.25	42	.74	
5. "Myself in the O.R." Semantic Differential				
Between	.32	2	.16	.64
Within	10.67	42	.25	
6. "Self" Semantic Differential				
Between	1.20	2	.60	1.85
Within	13.65	42	.32	
7. Medical Specialty Questionnaire (Surgery Ranking)				
Between	7.70	2	3.85	.97
Within	158.72	40	3.97	
8. Impression Paragraph: Word Frequency:				
Between	214.44	2	107.22	.26
Within	17493.33	42	416.51	
I-ME Frequency:				
Between	2.53	2	1.27	.37
Within	143.47	42	3.42	

Table 4.2. Summary of Analysis of Variance (cont'd)

Outcome Measures	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio
Affective Statement Frequency:				
Rater One				
Between	.58	2	.29	.83
Within	64.40	42	1.53	
Rater Two				
Between	.18	2	.09	.94
Within	61.73	42	1.47	

Table 4.3. Tests on Surgery Ranking

Test of Significance	Chi-Square	Degrees of Freedom	P Value
Chi-square	22.96	14	.06
Kruskal-Wallis One-Way ANOVA	1.48	2	.48
Median Test	2.79	2	.25

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION AND IMPLICATIONS

Summary

This investigation was an attempt to evaluate the effectiveness of a three-phase treatment based on the IPR model in increasing the learning and decreasing the emotional-physiological reactivity of medical students in their early surgical training. The study also sought to assess the effect of the treatment on medical student attitudes toward surgery and themselves and on students' career preferences.

The present study grew from Embelton's (1981) study and earlier work of Coppola, Cochran and Kagan. Coppola and Cochran (1979) surveyed medical students in their surgical clerkships and found that about one-third of the students reported unpleasant emotional-physiological reactions to common surgical stimuli. Kagan's IPR method had been used successfully to improve the patient interviewing skills of medical students (Werner & Schneider, 1974). Coppola and Cochran suggested to Kagan that the IPR method be adapted to assist students in their early surgical learning by reducing their responsiveness to noxious surgical stimuli. This collaboration among the three led to the Embelton (1981)

study which used a matched-pairs design to investigate the effects of a two-session IPR laboratory treatment on medical students' learning (observation) and anxiety in an early surgical experience. Embelton's study, conducted in the summer of 1979, found no significant differences between his groups, one of which received the two-session IPR laboratory treatment in which students viewed videotaped vignettes of actual surgical and simulated interpersonal events and the other of which received notreatment. A 1980 survey by Coppola and Cochran confirmed the incidence of negative reactions in clerkship students to early surgical experiences. Embelton (1981) discussed the possibility that the treatment had increased anxiety toward surgery and that this had masked any positive effects the treatment may have had. In addition, the treatment time was less than that given in IPR studies which had found significant results. Embelton offered several suggestions for strengthening the treatment and outcome measures which were incorporated into the present study.

The present study conceptualized the problem of the possible impact of adverse reactions to surgery on medical students' learning and anxiety in information processing terms. The information processing model was used as a theoretical base. The literature on the relationship between emotion and learning was reviewed, especially as it pertains to the processes posited by information processing theory. The influence of expectancy (Tolman, 1938; Bandura, 1977)

and of appraisal and reappraisal of threat on attention and retention processes and on emotional experience and expression has been shown by Arnold (1950), Lazarus (1966, 1968), and Bandura (1977). Bower (1981) and Weingartner et al. (1977) confirmed the influence of mood on the crucial learning process of memory.

The literature confirmed the Yerkes-Dodson Law, which emphasized the close relationship between attention and arousal and states that "with increases in arousal, performance on any task increases up to some point, beyond which further arousal leads to a decrease in performance" (Reynolds & Flagg, 1977, p. 27). On more difficult tasks, performance peaked earlier, a curvilinear relationship which Easterbrook (1959) explained in cue utilization terms. The important elements in the Easterbrook hypothesis were range and relevancy of cues utilized. Increases in arousal are associated with increasing selectivity of cues. Performance improves as irrelevant cues are ignored, depending upon the importance of "incidental learning" (Dusek, et al., 1975, 1976). Increases in arousal at some point cause relevant cues to be ignored, and performance deteriorates. Sarason (1972) and Wine (1971) suggested that more anxious students divide their attention between the demands of the task and preoccupation with somatic concerns and negative self-references. Less anxious students generally devote more of their attention to task demands and less concern to task-irrelevant issues. The greater the interference at this

point, the smaller the amount of instructional content available to be processed.

Spielberger, et al. (1970) operationalized his state-trait conceptualization of anxiety in the two forms of the State-Trait Anxiety Inventory, the State form of which was employed in the current study. Further explication of the multidimensionality of the concept of anxiety has been done by Deffenbacher (1980) and Endler (1980).

The literature on the importance of the clerkship, especially the surgical clerkship, in medical students' career choice generally confirmed the solidification of career choice through the course of medical school and the clerkships. Hutchins (1964) and Chapman (1976) reported that about one-third of students tend to change their minds one or more times during clerkships. Although this seemed to emphasize the importance of clerkships in career choice, students choosing surgery as a specialty generally made a firmer choice earlier than do other students (Wasserman, et al., 1969; Michigan Study, 1978).

Medical students' attitudes toward surgeons and surgery were clear and consistent. Surgery was consistently ranked very high in status and very low in social attractiveness to medical students (Zimet & Held, 1975; McGrath & Zimet, 1977). Bruhn and Parsons (1964) found that medical students viewed surgeons as "domineering, arrogant, and aggressive" (p. 43).

The treatment evaluated in the present study was based

on the IPR model (Kagan, 1979). The treatment goal was to increase students' awareness of their adverse reactions and explore positive ways of coping with these reactions.

A three-group posttest-only control group design was used. Group One students (n=15) were given two sessions in the IPR lab in which they were videotaped while viewing a series of color videotaped stimulus vignettes of actual surgical and simulated interpersonal events (e.g., various operations, a surgeon saying "Hold still, goddammit, I can't see what I'm doing."). Heart rate, skin conductance and respiration were monitored while the student viewed the vignettes. These records were shown to the student while the student viewed the videotape of him/herself and recalled his/her responses to the vignettes. The responses were discussed with an inquirer who encouraged exploration but left control of the discussion with the student. Group One students also viewed an instructional videotape offering methods of coping with adverse reactions. Students were then videotaped while watching an operation and reviewed the videotape to discuss their reactions to this experience with an inquirer. Group Two students (n=15) watched one operation prior to the outcome phase of the study, and Group Three (n=15) was a control group. Finally, student "triplets," consisting of one student from each group, observed an operation and responded to eight paper and pencil instruments intended to measure emotional-physiological reactivity, learning (observation), attitudes,

career preference, and impressions of this early O.R. experience. It was hypothesized that Group One would report less reactivity, be more observant and more positive in attitude toward themselves and surgeons, rank surgery more highly as a career preference, and have more positive impressions about the O.R. experience than the other two groups.

Analysis of variance and chi-square test of association, as well as two non-parametric tests on the surgery ranking, showed no significant differences among the three groups on the dependent variables. The chi-square test on the surgery ranking did show the three groups to differ in the hypothesized direction (i.e. Group One ranked surgery the highest of the three groups) at the .06 level of significance, but this result should be interpreted with caution, because several of the chi-square cells had fewer than five cases.

Conclusions

I. There were no significant differences among the three groups on the State Anxiety Inventory (STAI).

II. There were no significant differences among the three groups on the Operating Room Experience (ORE) Inventory.

III. There were no significant differences among the three groups on the Apprehension to Surgical Procedures Questionnaire (ASPQ). The results of the ASPQ revealed that

the medical students rated the following seven surgical stimuli as the most bothersome of the thirty-six ASPQ stimuli: helplessness of the patient, mutilation, incision, wearing mask, intubation, retracting, and cauterization. These results were similar to those of Embelton (1981).

IV. There were no significant differences among the three groups on the "Surgeon," "Self," and "Myself in the O.R." semantic differentials. Of the three semantic differential instruments employed in the study, the "Surgeon" and "Self" inventories yielded the most interesting results. The students' scores on the individual items of these two identical lists of polar adjectives added qualified confirmation to the findings of earlier investigators. Although students in the present study described themselves and surgeons more similarly than did students in other studies, the different adjectives which students ascribed to surgeons (egotistic and arrogant) as opposed to themselves (altruistic and humble) supported the notion of the negative surgeon stereotype.

V. ANOVA and two non-parametric tests of group rankings of surgery as a career specialty showed no significant differences among the groups, although Group One did rank surgery higher than the other two groups. A chi-square test of association revealed a difference among the groups significant at the .06 level, but as already mentioned this result should be interpreted cautiously

because there were fewer than five cases in several of the chi-square cells.

VI. There were no significant differences among the three groups on the word count, first-person personal pronoun count, and affective statement count in the Impression Paragraph.

Discussion

The most obvious conclusion from the data analysis was that the treatment did not make a difference. This section focuses on four general areas of the study in an attempt to interpret the lack of significant results. The areas are: sample, theory, treatment, and instrumentation.

Sample

There was considerable experimental mortality in the study (26%). Although the final sample size of 45 medical students did not yield results as firm as a larger sample could have, the sample size was adequate to perform the planned analyses. There was little differential mortality from the three groups, but more males (93%) than females (28%) and more osteopathic (79%) than allopathic (65%) students completed the study (Table 3.1). In addition to limiting the generalizability of the results, these figures shed light on some issues central to the study. The much higher attrition rate of females may relate to factors such as the mostly-male composition of the research team and of surgical specialties generally, but it may also relate to

the issue of adverse reactions to surgical stimuli. Given that scheduling was a difficulty, especially in the outcome phase of the study, why did such a lower percentage of women students complete the study than men? Traditional sex role stereotypes may have interacted with the fact of male domination of surgery. Although the number of women surgeons in the United States doubled from 1970 to 1978, women still comprised less than four percent of the total number of surgeons in the country (American College of Surgeons, 1980). Did some of the female students see less reason to seek (additional) early exposure to surgery than did their male counterparts because the females saw themselves as largely excluded from a surgical career? Or were the female students more sensitive to surgical scenes? Such speculations may explain the female students being less enthusiastic about the study, less flexible in their time schedules, and therefore more likely to not complete the study. Still, explanations of this phenomenon remain in the domain of conjecture.

The differential participation of College of Osteopathic Medicine (COM) and College of Human Medicine (CHM) students seemed to relate primarily to opportunities for exposure to surgery, which were much greater for CHM students than for COM students. CHM students had a required surgical clerkship as part of their training and COM students did not. Presently, the vast majority of surgeons

are allopathic physicians.

It is possible that women students and allopathic students may differ from men and osteopathic students, respectively, in their reactions to surgery due to some of the surgical education issues cited above. If so, a treatment administered to a more representative sample might have been successful in producing intergroup differences. All the students who participated seemed to value the opportunity provided by the study for exposure to surgery, but this was especially true for the osteopathic students.

Theory

The literature on arousal, cue utilization and incidental learning was especially relevant in explaining the lack of significant findings in the study. Easterbrook (1959) hypothesized that as arousal increased, the range of cue use was reduced. Dusek et al. (1975; 1976) found, however, that lower anxiety was associated with better learning on a central task but poorer incidental learning. As Embelton (1981) speculated, it may be that the treatment increased arousal to the point of reducing the range of cue use. Previous IPR studies had found significant differences between treatment and control groups, but usually in training programs of twenty to fifty hours (Dendy, 1971; Kingdon, 1975). But if the treatment did not make a positive difference, neither did it have a negative impact, which would have added support to Embelton's "oversensitiza-

tion" hypothesis, which states that the treatment may have increased anxiety. Another possible explanation of these results was that the outcome measures were flawed in such a way that Group One was less anxious than the other groups and was therefore somewhat less observant of incidental stimuli. Therefore, to the extent that the Operating Room Experience (ORE) inventory measures incidental learning, one could have expected Group One to score lower than the other two groups on this measure if Group One students were in fact less anxious.

The nature of medical student reactivity to surgery and the effects of this reactivity on early surgical learning, attitudes and career preference are complex. A major element of this complexity probably lies in the idiosyncracy of this reactivity and its effects, in short, in individual psychology. In addition, the surgeon must confront and deal with crucial situations unlike those normally encountered by others. Selzer (1979) testifies eloquently to the idiosyncracy of this rare interaction of individual and situation, the act of surgery:

> Forty years ago my father was a general practitioner in Troy, New York. That was before the age of specialization in medicine, and family doctors did just about everything-delivered babies, set broken legs, and removed ruptured appendixes. Despite this last, I do not think of him as a surgeon. I never watched him standing at an operating table, making an incision. But I did see him every Sunday, kneeling in his garden which he treated as though it were a ward full of patients. All day long he spent there, pruning, excavating weeds or splinting a slender stalk and marveling aloud at the exuberant swelling that

> bloomed at its tip. Now I am the age that he was. Then we are the same age! And now I can see what I must have seen years ago but had forgotten-his hairless white wrists submerged among the carnations, as though gripped by the lips of an incision. I do not see his fingers, hidden as they were in the foliage, busy down below, repairing the work. But I remember the air carved by bees, and the slow respiration of the trees.
>
> Sometimes, even now, in my operating room, as I clamp, ligate, and suture, I know a deeper kinship with my father. Something arcs across the decades, like a rainbow that binds the earth as if it were gift. Why just today a red flower bloomed at the end of my scalpel: a poppy, I think. It seemed a miracle, like the leafing out of a shepherd's crook. I pinched off the bloom and tied down the stem with thread. My father was right. Surgery is gardening (p. 109).

Endler's (1980) proposal of a person-situation interaction model of anxiety holds promise for future exploration of specific interactions like that of the medical student in early surgical training. Building on the state-trait theory of Spielberger et al. (1970), Endler identified cognitive-worry (such as negative self-evaluations) and emotional arousal components in state-anxiety, and social evaluation, interpersonal ego threat and physical danger dimensions of trait-anxiety. Some of these dimensions, e.g., social evaluation and interpersonal ego threat, may have bearing on medical students' early surgical training. This model is referred to again in the instrumentation section in this chapter.

Treatment

As stated in the previous section, it is possible that the amount of treatment time "was insufficient to effect such basic and aversive reactions to surgical stimuli and the whole nature of surgery, which is viewed as an aggressive act "(Embelton, 1981; p. 88). The addition of the instructional component and of the hospital recall was intended to strengthen the treatment, but the results did not confirm this. The instructional videotape was a shortened version of a videotape which previous groups of students had reported as helpful in their adjustment to the surgical clerkship. The fact that the excerpt dealt only with coping with adverse reactions in the operating room and that it was viewed by the students at the end of the second laboratory session, when the effects of the vignettes were very fresh, may have lessened its positive effect on students' confidence in their ability to cope with their reactions. The IPR recall of the Group One students in their first surgical experience in the study was intended to strengthen the laboratory treatment by in vivo exposure. Based on the author's observations through the course of the study, the videotaping of the medical student in his/her first surgical experience in the study introduced another element in the situation, possibly altering the situation enough to affect the student's experience of it. Most students showed interest in the surgical procedures observed and recalled this interest and curiosity in the recalls.

They generally seemed less concerned with, aware of, and/or willing to discuss with the inquirer any adverse reactions they may have experienced. This may have been due partly to the students' greater interest in the opportunity to observe an operation than in processing his/her reactions to it with the inquirer. Individual styles of learning, coping and defense may well be important variables influencing the relative impact of the IPR method on medical students. Perhaps videotaping and doing recalls with students on their second or third O.R. observation would have been more beneficial.

Creation of life-like vignettes was a problem in the current study, as it had been in Embelton's (1981) study. Operating room lights made true color reproduction very difficult. Some students commented on this, as well as on the acting ability of some of the actors in the vignettes. The actual surgery vignettes used in the present study were generally longer than those used by Embelton, which allowed students sufficient time to orient themselves to the particular anatomy involved in the surgery. Students generally showed interest and curiosity toward the vignettes similar to that which they displayed in the hospital recall treatment experience, but were perhaps more relaxed during the vignette recalls than the hospital recalls, assuming that greater tension is associated with an actual operating room experience than with a laboratory experience.

Instrumentation

The State Anxiety Inventory (Spielberger, et al., 1970) was the only standardized measure used in the study. Although this measure had generally good reliability, it may have missed dimensions of anxiety discussed by Endler (1980). In referring to three of the dimensions of person-situation interaction anxiety, Endler stated that:

> In order for the person-by-situation (trait-by-situational stress) interaction to be effective in inducing A-State, it is necessary for the A-Trait measure to be congruent to the threatening situation. For example, . . . interpersonal ego threat A-Trait will interact with an interpersonally ego-threatening situation to elicit A-State changes, but will not interact with physical danger A-Trait or with an ambiguous threat situation (p. 263).

Current work by Endler and others may produce an instrument which may be more successful than the STAI in assessing, for example, interpersonal ego threat possibly experienced by medical students in their early surgical training.

It is conceivable that better scores on the Operating Room Experience (ORE) inventory may not be indicative of better learning due to a decrease in interference of emotional-physiological reactions. The ORE attempted to measure observation in the operating room and was composed largely of questions about the presence, number, and descriptions of objects and events in the O.R. To the extent that the ORE focused on attention to incidental stimuli, the findings of Dusek, et al. (1975, 1976) predict that less anxious students would score lower on this measure

than more anxious students. It is possible that the ORE failed to measure some more central yet subtle learning which occurs in the O.R.

The Surgery Ranking was the only measure which approached significance in this study, although the result requires cautious interpretation. It cannot be interpreted that the treatment increased the number of students who prefer surgery as a career specialty, but the surgery ranking result may imply a more positive attitude toward surgery on the part of Group One students.

The Impression Paragraph was a highly exploratory measure and was employed on the chance that it might tap a difference among the groups which might not show on any of the other measures. The measures of global, self-referenced, and affective expression revealed no differences among the groups.

Implications

The level of student interest and participation in the study attested to students' enthusiasm and desire for early exposure to surgery in the course of their medical training. This was especially true for male students and for osteopathic students. Some students had frequent opportunities to observe operations prior to their surgical clerkships, but many students felt apprehensive about early surgical experiences. Informal ways of increasing pre-clerkship opportunities for medical students to observe surgical procedures would be welcomed by many students.

Some students might be assisted in coping with their adverse reactions to surgery by a treatment program like that used in the present study; but the unique learning, coping, and defense style which the student brings to the surgery situation must be better understood and considered in attempting, for example, to predict which students will find this type of experience helpful to them. As Tobias (1979) pointed out, all treatment approaches may not equally benefit all individuals. The IPR treatment experience no doubt had different effects on different students. Future research could explore this differential effect by investigating the relationship between level of disclosure during recall, for example, and various personality, motivational strength and content, and information-processing style variables.

The relative crudeness of the instrumentation in the present study may have masked treatment effects. Embelton's results and the results of this study do not necessarily mean that the treatment approach was ineffective. A prime area of interest in this regard was that of self and interpersonal awareness. The treatment sought to increase medical students' awareness of themselves and others, but such differences may be very subtle and not subject to easy measurement. A new research instrument which explores medical student awareness as it relates to surgery and surgical procedures more fully than did the measures employed in this study might uncover a treatment effect not

found by the present measures.

Given the complexity of the phenomenon under investigation in this study, perhaps too much was expected of the treatment, especially in regard to the attitudinal and surgery preference measures. Attitudes are frequently quite robust, as are surgery preferences relative to preferences for other specialties. Perhaps an expectation of measurable change in these areas after a treatment of a few hours is unrealistic.

This study represented a unique collaboration in the field of medical psychology and was highly exploratory in nature. Further research in this area should focus on examination of individual cases of medical students who experience adverse reactions to surgery and are motivated to explore these reactions in depth. Such ethnographic study might contribute significantly to understanding the nature and effects of these reactions and to development of new approaches to ameliorate them. The methods of ethnographic study match more closely the requirements for investigating such idiosyncratic phenomena as medical students' introduction to the operating room and to surgery.

APPENDIX A

INVITATION TO PARTICIPATE

FIRST AND SECOND YEAR STUDENTS IN CHM AND COM

Edward D. Coppola, M.D. and Norman Kagan, Ph.D.

In the hope of improving the surgical experience for medical students, we intend to offer again this year, over the summer period, a unique and exciting opportunity for students to prepare for their surgical clerkships or preceptorships. Although these procedures are experimental, the students who participated last year had very positive reactions to the experience. Basically this preparatory learning experience will require the following time commitment sometime between June 16 and August 22:

A. Two sessions of about two hours each of viewing surgical films and then reviewing and recalling a videotape of your reactions to the films. Ongoing physiological responses will be monitored.

and/or

B. Two sessions of about three hours each of actual surgical experience in an operating room.

In addition, four short questionnaires will be given.

If you are interested in participating, please complete the attached page and return by May 22 to:

Edward D.Coppola, M.D.
B421 Clinical Center
Department of Surgery
Michigan State University

Phone: 353-5450

TO: Medical Students

FROM: Russ Hogan, Coordinator of 1980
Summer Pre-Surgery Education Project

Date: June 5, 1980

RE: Third time around!

If you have already returned the participation form for the 1980 Summer Pre-Surgery Education Project sponsored by Dr. Coppola and Dr. Kagan, please disregard this note.

For those of you who did not return the participation form, I wanted to let you know that we are <u>especially</u> interested in students who have had little or no surgical experience. So if you have observed or assisted at no operations or very few and are interested in getting some experience, please complete and return the form if you still have it, pick up a new form in B-414 Clinical Center, or call Maggie at 353-5450 in the daytime, or me at 351-2216 at night.

If you have already sent in the form or plan to, we will be contacting you next week.

Thanks.

APPENDIX B

PARTICIPATION FORM

Pre-Surgery Education Project

(Please Print)

A. NAME AGE: MALE/FEMALE

B. ADDRESS:

ZIP CODE:
PHONE # :

C. PLEASE CIRCLE YEAR AND PROGRAM

FIRST YEAR SECOND YEAR CHM COM

D. PREVIOUS HOSPITAL AND MEDICAL EXPERIENCE:

1. Self, as patient in surgery
2. Assistant in childbirth
3. Had close relative of immediate family involved in a significant period of hospitalization
4. One or both parents are medical practitioners (father/mother; specialty(ies)
5. Assisted in helping patients in hospital after surgical operation
6. Number of surgical procedures (from minor, e.g. suturing, to major, e.g. abdominal surgery) observed:

	0	1	2-3	4-6	7-11	12-20	20+
Emergency Room	___	2	5	10	18	32	48
Operating Room	___	4	10	20	36	64	96
Physician's Office	___	1	2.5	5	9	16	24

7. Number in which you assisted (scrubbed in and participated):

	0	1	2-3	4-6	7-11	12-20	20+
ER	___	4	10	20	36	64	96
OR	___	6	15	30	54	96	144
Physician's Office	___	2	5	10	18	32	48

8. Other previous clinical medical or surgical experience - please describe:

MY BEST TIMES DAILY (8:00 a.m. - 8:00 p.m.) BETWEEN JUNE 16 AND AUGUST 22 ARE:

(specify times) SUNDAY MONDAY TUESDAY WEDNESDAY THURSDAY FRIDAY SATURDAY

RETURN TO: EDWARD D. COPPOLA, M.D.
B421 Clinical Center
Department of Surgery
Michigan State University

BY MAY 22

APPENDIX C

INQUIRER PROCEDURES

1980 Surgery Project

INQUIRER PROCEDURES

Especially for COM, less for CHM:

A. Describe Procedures

1. Hook-up
2. Watch vignettes
3. Let him/her get involved with vignettes as much as possible
4. Videotaping
5. Split screen
6. Recall- thoughts, feelings, images, impressions, physical reactions

B. At Beginning of Recall, Explain Recall Process

1. Briefly explain physio
2. Student has control
3. Encourage to stop after each vignette
4. Talk about reactions
5. Taping

C. During Recall

1. Usual inquiry leads
2. Surgery project leads
3. Focus on affective (especially anxiety, fear and physical manifestations) and cognitive (cues to type of operation, thoughts, etc.)
4. Use inquiry to help person label thoughts and feelings
5. Neither too deep to be appropriate nor too shallow to be meaningful - if not sure, ask student
6. Open-ended, exploratory, sensitive

INQUIRER LEADS

Lab and O.R.R.

How might you have responded to that situation?

What do you think you could do about that reaction (e.g., feeling nauseated) when it occurs?

What did you experience physiologically when that occurred? (When you had that feeling?) (Anything in muscles, stomach, throat?)

What kind of operation did you think it was?

What cues made you think that?

What did you think/feel about the patient/surgeon/anesthesiologist/nurse at that point?

What did you think the surgeon/anesthesiologist/nurse was thinking (feeling) at that point?

APPENDIX D

TYPESCRIPTS OF VIGNETTES

1980 Surgical Vignettes
Tape One

Introduction by R. E. Hogan

1. Patient on a cart: "How long will the operation take, doctor? When can I know the results?"

2. Operation: Prepping, draping, incision, and dissection of a right carotidendarterectomy.

3. Operation: Intubation of an exploratory laparotomy with excision of abdominal mass.

4. Operation: Local anaesthetic preparation for intubation.

5. Operation: Incision through steridrape, electro-cauterizing hemostasis, and dissection through abdominal wall of appendectomy of a 6 y.o. male.

6. Operation: Incision and clamping of bleeders (of probable ? cholecystectomy ?)

7. Surgeon: "Well now, what do you think this is? Oh come on now, you can take a guess ... The pancreas? You think this is the pancreas? (laughter) "

8. Operation: Chest retractors in place. Heart and aorta in view. Resection of dissecting aneurysm of the thoracic aorta in progress.

9. Surgical Scrub: "This time, sweety, don't put your hands below the table and contaminate yourself."

10. Operation: Split-thickness skin graft taken from right upper thigh of burned patient.

11. Operation: Suturing right inguinal incision of an embolectomy of a 77y.o. female under local anesthesia. Surgeon talks to patient. Undraping of the patient and dressing of the wound.

12. Circulating Nurse: "That surgeon is a son-of-a-bitch. He treats you like shit - the way he snaps orders. I hate his guts. Wouldn't you agree?"

1980 Surgical Vignettes
Tape Two

1. Surgeon: "Well folks are we ready? Oh, you're the student. Do you think you're up to this?"

2. Patient: Crying baby.

3. Operation: Ankle incision.

4. Operation: Hand debridement.

5. Surgeon: "He died before we could begin to operate. I'd like you to go with me to tell the family."

6. Operation: Hip reconstruction.

7. Circulating Nurse: "Now you've contaminated yourself. Don't touch anything. Stand there and don't move. Don't they teach you medical students anything?"

8. Operation: Facial incision.

9. Surgeon: "Will you hold still? I can't see what I'm doing. God damn it."

10. Operation: Hernia.

11. Patient: Baby.

APPENDIX E

TRANSCRIPT OF INSTRUCTIONAL COMPONENT

Excerpted from: Learning on the Surgical Clerkship -- In the O.R. (Doran, Cochran, English, Alexander, 1979).

Before going into the OR, you should know what to do in case you start to feel ill.

We have found that 30% of medical students experience this common problem.

The reactions you should be aware of are:

a. a sensation of warmth, particularly facial
b. mild nausea or queasiness
c. excessive perspiration
d. A sensation that something is wrong, but you are not clear, not sure what's wrong.

What should you do?

To cope with a mild physiological reaction, you could try:

a. lowering your head or looking away from the surgical field
b. thinking of something else
c. concentrating on the more objective aspects of the situation or
d. stepping back from the table for a few minutes

If these suggestions do not help and you feel as if you might faint or vomit, then you should leave the operating room promptly with the understanding that you may return, and then,

sit down and wait until you feel better.

Or

drink some water or have a light snack.

Many students feel embarrased about leaving the OR. If you have to leave the OR and return, that doesn't mean you are unqualified or unprepared.

Remember that leaving is a positive, responsible approach to solving a natural reaction to surgical procedures.

APPENDIX F

LETTER TO SURGEONS

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF SURGERY · B412 CLINICAL CENTER
(517) 353-8730

EAST LANSING · MICHIGAN · 48824

May 23, 1980

This note is to introduce Mr. Russ Hogan, a graduate student in educational psychology, who this summer will be doing the field work for his doctoral dissertation under my supervision.

The project is a continuation of the Pre-Surgery Education Project begun last summer in which you may have participated.

We have found that about 1/3 of all medical students have serious adverse physiological and psychological responses to the environment and activities in the operating rooms. These reactions and experiences may not only impair student learning in the OR, but also may turn bright and gifted students away from considering surgery as a career.

In order to find out more about this, a controlled experiment with improved design will be done in June, July, and August. One group of students will have a form of "combat training" before going to watch a surgical procedure of magnitude, another group will not. The training will be done in two stages using videotaped material, polygraph recordings, and recall sessions in a laboratory environment.

We need the help of surgeons who would like to participate by letting "trained" and "untrained" students watch their operations for purposes of evaluation of the training.

Mr. Hogan will be glad to provide further details and respond to any questions you might have. I'd greatly appreciate your willingness to participate in this unique work in surigcal education by assisting Mr. Hogan.

Sincerely,

Edward D. Coppola

Edward D. Coppola, M.D.
Professor of Surgery

EDC/ms

APPENDIX G

INFORMED CONSENT FORM

3/11/80

PRESURGERY EDUCATION PROJECT

INFORMED CONSENT FORM

Videotapes of your operation will be used in the education of medical students for surgery.

1. I have freely consented to take part in an educational study being conducted by Edward D. Coppola, M.D., Professor of Surgery, Michigan State University at Ingham Medical Center and Sparrow Hospital.

2. I understand that I am free to discontinue my participation in the study at any time without penalty.

3. I understand that the results of the study will be treated in strict confidence and that I will not be identified by name.

4. I understand any of my inquiries regarding the research project will be answered.

5. I understand that my participation in the study does not guarantee any beneficial results to me.

_____

Patient Signature Date

_____

Surgeon Signature Date

_____

Witness Signature Date

APPENDIX H

INSTRUCTION SHEET

O.R. OBSERVATION AND QUESTIONNAIRES

For this phase of the Pre-surgery Education Project, you will observe an operation for 1-1½ hours with 2 other medical students. After you observe the operation, you will change out of your scrubs and go to another room to respond to some questionnaires. The questionnaires will take about 35 minutes and relate to:

1) your observations in the O.R.
2) your reactions to the O.R. experience
3) some of your attitudes about surgery

It is important that your O.R. observations and reactions be <u>independent</u> of those of your 2 fellow observers, so we ask that you

1) <u>not discuss your activities in the Project</u>

and

2) <u>not discuss your observations or reactions before, during or after the operation. This is especially important while you are in the O.R.</u>

We want you to have equal chances to observe the procedure, so if you must take turns occupying the best position for observing, please do so. Remember that we are guests in the O.R., so please be considerate of the surgeon and other O.R. personnel. If you need to leave the O.R. for any reason during the operation, you may return later.

APPENDIX I

OUTCOME MEASURES

SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

STAI FORM X-1

NUMBER _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you generally felt while you were in the OR. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your feelings in the OR best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I felt calm	①	②	③	④
2. I felt secure	①	②	③	④
3. I was tense	①	②	③	④
4. I was regretful	①	②	③	④
5. I felt at ease	①	②	③	④
6. I felt upset	①	②	③	④
7. I was worrying over possible misfortunes	①	②	③	④
8. I felt rested	①	②	③	④
9. I felt anxious	①	②	③	④
10. I felt comfortable	①	②	③	④
11. I felt self-confident	①	②	③	④
12. I felt nervous	①	②	③	④
13. I was jittery	①	②	③	④
14. I felt "high strung"	①	②	③	④
15. I was relaxed	①	②	③	④
16. I felt content	①	②	③	④
17. I was worried	①	②	③	④
18. I felt over-excited and "rattled"	①	②	③	④
19. I felt joyful	①	②	③	④
20. I felt pleasant	①	②	③	④

CONSULTING PSYCHOLOGISTS PRESS
577 College Avenue, Palo Alto, California 94306

Number_____

Date_____

OPERATING ROOM EXPERIENCE

QUESTIONNAIRE

Complete the following questionnaire based on your observations in the Operating Room. Please do not discuss any of these questions with any other students who are participating in the Project. Results of the questionnaire are for research purposes only. Your paper will be identified by number only.

1. Approximate age of the patient (Enter one number only)_____

2. Sex of patient Male Female

3. Skin color of patient _____

4. What type of operation did you observe? (If you do not know the scientific name, describe in your own words)

5. List in order of occurrence what was done to the patient from the time of your entry into the OR until the incision was made. Be comprehensive but concise.

6. How many I.V. lines were started? (Enter one number only) _____

7. How many I.V. bottles were hung? (Enter one number only) _____

8. Was an endotracheal tube used? YES NO

9. Was a ventilator machine used? YES NO

10. Where was the incision made?

11. Approximately how long was the incision in inches? (Enter one number only) _____

12. What internal anatomical parts were exposed during the operation?

(OVER)

13. Which of the following instruments were used during the operation? (Circle)

A. scalpel
B. Clips
C. tissue clamp (hemostat)
D. self-retaining retractor
E. hand-held retractor
F. right-angle clamp
G. dissecting scissors
H. tissue forceps
I. suction
J. extractor
K. Bovie (electro cautery)

14. Was blood transfusion given? YES NO

15. List the steps in sterile techniques that you observed before and during the operation. Be comprehensive but concise.

16. Did the surgeon remark about any unexpected or unusual findings or pathology during the operation? YES NO

If yes, what were they?

17. How many, including the surgeon(s), were involved in the handling and care of this patient while s/he was in the operating room? (Enter one number only) _____

18. How many people scrubbed and assisted the surgeon at the operating table during the operative procedure itself? (Enter one number only) _____

19. Was the surgeon right- or left-handed? RIGHT LEFT

20. Was the patient lying face-up, face-down, or on his/her side:

FACE-UP FACE-DOWN ON SIDE

Number_____

Date_____

ASPQ - FORM E

1. While you were in the OR, did you have any unpleasant physiological and/or emotional reaction(s) to the experience?

   YES - Answer questions (2) through (6)

   NO - Go to question (6)

2. What reaction(s) did you have? Check those that apply.

_____Nausea or wooziness	_____short of breath
_____dizziness	_____shaky
_____lightheadedness	_____cold and clammy
_____fainting	_____fear
_____vomiting	_____loneliness
_____sweating	_____queasiness
_____weakness in the knees	_____sadness
_____blurred vision	_____annoyance at OR personnel
_____uneasiness	_____tunnel vision
_____anxiety	_____hot
_____weakness	_____other (describe)
_____increased heart rate or palpitation	

3. In general, about how much of the time when you were in the OR did you feel uncomfortable or have the above reaction(s)?

_____less than 2 minutes	_____16-20 minutes	_____36-40 minutes
_____2-5 minutes	_____21-25 minutes	_____41-45 minutes
_____6-10 minutes	_____26-30 minutes	_____over 45 minutes
_____11-15 minutes	_____31-35 minutes	

4. Did you leave the OR during the operation? YES NO

   If YES, did you return? YES NO

5. How did you cope with your reactions? Check those that apply.

   _____lowered my head

   _____looked away from the surgical field

   _____thought of something else

   _____concentrated on the more objective aspects of the situation

   _____stepped back from the table or moved around

   _____left the OR

   _____other (describe)

Number_____

Date_____

6. The purpose of this questionnaire is to identify things that you were sensitive to while you were in the Operating Room. This sensitivity may have manifested itself by a physiological and/or emotional response. Using the rating scale, check the box which best represents how much you were bothered by each stimulus. There are some stimuli below which you may not have encountered during this operation. If that is the case, please check "does not apply."

		Didn't bother me	Bothered me a little	Bothered me a lot	Does not apply
1.	suturing	_____	_____	_____	_____
2.	cutting	_____	_____	_____	_____
3.	shaving	_____	_____	_____	_____
4.	applying bandages	_____	_____	_____	_____
5.	cauterization	_____	_____	_____	_____
6.	expression of pain	_____	_____	_____	_____
7.	wearing scrub suit	_____	_____	_____	_____
8.	wearing mask	_____	_____	_____	_____
9.	intubation	_____	_____	_____	_____
10.	unconsciousness of patient	_____	_____	_____	_____
11.	insertion of IV	_____	_____	_____	_____
12.	nakedness	_____	_____	_____	_____
13.	prepping the skin	_____	_____	_____	_____
14.	blood transfusion	_____	_____	_____	_____
15.	mutilation	_____	_____	_____	_____
16.	smell	_____	_____	_____	_____
17.	surgical instruments	_____	_____	_____	_____
18.	amputation	_____	_____	_____	_____
19.	removing bandages	_____	_____	_____	_____
20.	surgeon's expression of anger	_____	_____	_____	_____
21.	monitors	_____	_____	_____	_____
22.	noise and sounds	_____	_____	_____	_____
23.	presence of IVs	_____	_____	_____	_____
24.	needles	_____	_____	_____	_____
25.	surgeon making disparaging remarks	_____	_____	_____	_____
26.	incision	_____	_____	_____	_____
27.	blood	_____	_____	_____	_____
28.	retracting	_____	_____	_____	_____
29.	patient vomiting or retching	_____	_____	_____	_____
30.	induction of anesthesia	_____	_____	_____	_____

(OVER)

		Didn't bother me	Bothered me a little	Bothered me a lot	Does not apply
31.	helplessness of patient	_____	_____	_____	_____
32.	pus	_____	_____	_____	_____
33.	seeing patient under general anethesia	_____	_____	_____	_____
34.	injections	_____	_____	_____	_____
35.	insertion of urethral catheter	_____	_____	_____	_____
36.	tremor of surgeon's hands	_____	_____	_____	_____

goo

1)
2)

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

Number_____

Date_____

SEMANTIC DIFFERENTIAL

SURGEON

Instructions: Please rate the concept SURGEON (your concept of SURGEON or what SURGEON means to you) on the following scales by placing one check mark per line in the space which indicates how closely related you feel the concept SURGEON is to one or the other end of the scale:

	very closely related	quite closely related	only slightly related	neutral or equally associated	only slightly related	quite closely related	very closely related	
good	/	/	/	/	/	/	/	bad

For example, if you feel that the concept SURGEON is only slightly related to one side of the following scale as opposed to the other side (but is not really neutral), then you would place your check here:

good_____/_____/ X /_____/_____/_____/_____bad

or here

good_____/_____/_____/_____/ X /_____/_____bad

1) Place your check-marks in the middle of spaces, not on the boundaries.
2) Please check each scale using one check per scale.

Make each scale a separate and independent judgment. Work fairly rapidly through the scales. Do not worry or puzzle over individual items. It is your first impressions, the immediate feelings about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

SURGEON

1.	kind	/	/	/	/	/	/	cruel
2.	unpleasant	/	/	/	/	/	/	pleasant
3.	egotistic	/	/	/	/	/	/	altruistic
4.	not compassionate	/	/	/	/	/	/	compassionate
5.	repulsive	/	/	/	/	/	/	attractive
6.	sensitive	/	/	/	/	/	/	insensitive
7.	caring	/	/	/	/	/	/	uncaring
8.	interesting	/	/	/	/	/	/	boring
9.	not angry	/	/	/	/	/	/	angry
10.	cooperative	/	/	/	/	/	/	uncooperative
11.	unaware	/	/	/	/	/	/	aware
12.	flexible	/	/	/	/	/	/	rigid
13.	thoughtful	/	/	/	/	/	/	impulsive
14.	respectful	/	/	/	/	/	/	disrespectful

(OVER)

Page 2 SELF

good	very closely related	quite closely related	only slightly related	neutral or equally associated	only slightly related	quite closely related	very closely related	bad

13. thoughtful / / / / / / impulsive
14. respectful / / / / / / disrespectful
15. slow / / / / / / fast
16. passive / / / / / / active
17. humble / / / / / / arrogant
18. relaxed / / / / / / tense
19. dishonest / / / / / / honest
20. secure / / / / / / insecure
21. calm / / / / / / excitable

Number _____

Date _____

SEMANTIC DIFFERENTIAL

MYSELF IN THE O.R.

Instructions: Please describe yourself as you were for your first twenty minutes in the O.R. on the following scales by placing one check mark per line in the space which indicates how strongly you felt for each scale:

Aware	very much so	moderately so	somewhat	somewhat	moderately so	very much so	Unaware

For example, if you felt somewhat aware, then you would place your check here

aware			X				unaware

1) Place your check marks in the middle of spaces, not on the boundaries.

2) Please check each scale using one check per scale.

Make each scale a separate and independent judgment. Work fairly rapidly through the scales. Do not worry or puzzle over individual items. It is your first impressions, the immediate feelings about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

MYSELF IN THE O.R.

1.	not observant		observant
2.	confident		frightened
3.	alert		unalert
4.	self-aware		not self-aware
5.	impulsive		thoughtful
6.	calm		excitable
7.	uncomfortable		comfortable
8.	emotional		unemotional
9.	understanding		not understanding
10.	closed		open
11.	subjective		objective

Number_____

Date_____

SPECIALTY QUESTIONNAIRE

1. Place a check next to the specialty which you plan to enter when you complete your training. If your planned specialty is not listed, check the specialty which you think is closest to it and then write your planned specialty in the space marked "other."

_____Psychiatry
_____Pediatrics
_____Family Practice
_____Internal Medicine
_____Surgery
_____Radiology
_____Pathology
_____Obstetrics-Gynecology
_____Other_____

2. How sure are you of the specialty you plan to pursue?

_____very sure
_____moderately sure
_____slightly sure
_____unsure

3. Please rank these specialties in terms of their attractiveness to you as your career specialty. Place a "1" next to the specialty which you find most attractive, a "2" next to the one you find 2nd most attractive, etc. through "8" for the one you find least attractive.

_____Psychiatry
_____Pediatrics
_____Family Practice
_____Internal Medicine
_____Surgery
_____Radiology
_____Pathology
_____Obstetrics-Gynecology

Number_____

Date_____

IMPRESSION PARAGRAPH

1. In 25 words or less, please describe whatever impressed you about the operating room experience you just completed.

2. Please make any comments you wish about the Project.

APPENDIX J

INTERIM OBSERVATION FORM

INTERIM OBSERVATION FORM

Number_____

Date_____

Please indicate below any hospital and medical experience you have had, especially operations you have observed or assisted at, since about June 1, 1980 (experience you have had since you completed the participation form for this Project). Do not include any operations which you have observed as part of this Project:

1. Self as patient in surgery
2. Assistant in childbirth
3. Had close relative of immediate family involved in a significant period of hospitalization

5. Assisted in helping patients in hospital after surgical operation
6. Number of surgical procedures (from minor, e.g. suturing, to major, e.g. abdominal surgery) observed:

	1	2-3	4-6	7-11	12-20	20+
Emergency Room	____	____	____	____	____	____
Operating Room	____	____	____	____	____	____
Physician's Office	____	____	____	____	____	____

7. Number in which you assisted (scrubbed in and participated):

	1	2-3	4-6	7-11	12-20	20+
ER	____	____	____	____	____	____
OR	____	____	____	____	____	____
Physician's Office	____	____	____	____	____	____

8. Other clinical medical or surgical experience - please describe:

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REFERENCES

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