Technical Report 66-12

A Conceptual Model of Behavior Under Stress, With Implications for Combat Training

by

Richard P. Kern

HumRRO Division No. 3 (Recruit Training)

June 1966

Prepared for:

Office, Chief of
Research and Development
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Contract DA 44-188-ARO-2

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The George Washington University
HUMAN RESOURCES RESEARCH OFFICE
operating under contract with
THE DEPARTMENT OF THE ARMY

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HumRRO Division No.3 (Recruit Training)
Presidio of Monterey, California

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Technical Report 66-12
Task FIGHTER
Subtask V

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FOREWORD

This report on Subtask V of HumRRO Task FIGHTER describes the conceptual framework developed regarding what happens to individuals under the severe psychological stress of combat, and utilizes this conceptual framework to view combat training and the objectives it must accomplish if it is to increase an individual's stress resistance for subsequent combat.

Task FIGHTER, Factors Related to Effectiveness and Ineffectiveness of Individuals in Combat, was undertaken by the Human Resources Research Office at the request of the Department of the Army, to study the causes of behavioral degradation under psychological stress and to develop suggestions for Army personnel management and combat training procedures for reducing the severity of this problem. Task FIGHTER research was performed by HumRRO Division No. 3 (Recruit Training), Presidio of Monterey, California. Dr. Howard H. McFann, currently Director of Research, was also Director of Research at the initiation of the conceptual development described in this FIGHTER V report; Dr. John E. Taylor served as Director of Research during part of this effort.

Military support for the study was provided by the U.S. Army Training Center Human Research Unit. Military Chief of the Unit at the initiation of the Subtask was Lt. Col. Carl E. Green; present Unit Chief is Lt. Col. David S. Marshall.

The staff of the Subtask during the reported phase of the work included Dr. Richard P. Kern, Mr. Kan Yagi, Dr. Don E. Batten, Dr. James J. Tschudy, and Dr. Joanne J. Hood. Military assistants were SP 4 Jerald H. Selvig, SP 4 Brian J. Bowden, SP 4 Perry R. Timmermans, and PFC Donald R. Knell.

Dr. McFann and Dr. Taylor assisted in developing the conceptualization of the stress process, with especial reference to implications of the concepts for the Army. Technical editing assistance in preparing the report was provided by Mrs. Lola M. Zook.

Selected HumRRO reports which summarize work accomplished on the four preceding Subtasks of Task FIGHTER are: FIGHTER I: An Analysis of Combat Fighters and Non-Fighters, Technical Report 44, December 1957, and FIGHTER I: A Study of Effective and Ineffective Combat Performers, Special Report 13, March 1958, by Robert L. Egbert, Tor Meeland, Victor B. Cline, Edward W. Forgy, Martin W. Spickler, and Charles Brown; Observations of Seven Armed Forces Specialized Training Schools, Staff Memorandum by Tor Meeland and Morris Showel, February 1957; Field Stress: A Preliminary Study of Its Structure, Measurement, and Relationship to Combat, Staff Memorandum by Tor Meeland, Robert L. Egbert, and Irwin Miller, May 1957; and Experimental Studies of Psychological Stress in Man, Research Report 10, by Mitchell M. Berkun, Hilton M. Bialek, Richard P. Kern, and Kan Yagi, December 1962 (published as Psychological Monographs, vol. 76, no. 15, Whole No. 534, October 1962). A complete listing of published work stemming from Task FIGHTER is contained in the HumRRO Bibliography of Publications.

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Meredith P. Crawford
Director
Human Resources Research Office

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON, D.C. 20310

CRD/J

SUBJECT: A Conceptual Model of Behavior Under Stress, With Implications for Combat Training

TO: COMMANDER
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1. This report describes the development of a conceptual model of behavioral reactions to a prolonged stress situation, and the implications of this model for training soldiers to withstand the stress of combat.

2. The conceptual model consists of a description of the theoretical, sequential pattern of behavior that results from continuing interactions between an individual's psychological resources and an environment of stress. On the basis of this model, the design of combat training to increase resistance to stress is discussed.

3. Personnel involved in research on stress resistance and in the development of training may be interested in this report.

FOR THE CHIEF OF RESEARCH AND DEVELOPMENT:

HERALD B. GALLINGER
Colonel, GS
Chief, Human Factors and
Operations Research Division

1 Incl
Report

Problem

Combat experience has shown that ineffective behavior attributable to stress is not restricted to a small minority of soldiers but is evident to varying extents in the behavior of most combat soldiers. These observations indicate that sporadic instances of ineffective behavior occur even under conditions where the soldier's overall performance is generally considered effective. The prevalence of ineffective behavior varies with the intensity and duration of the combat stressor conditions, as well as with the personality resources of the individuals. However, over time, all men show a progressive increase in the detrimental effects of intense or prolonged exposure to the psychological stressors of combat.

Task FIGHTER was undertaken as a long-range inquiry into the nature of human behavior under severe psychological stress. The ultimate objective of the effort was the development of possible approaches, through training, to improving the individual's ability to function effectively under the stresses of combat.

Research Approach

The work in Task FIGHTER was directed mainly toward three intermediate goals as steps to achieving the long-range objective of improving stress resistance. These goals were:

(1) The identification of psychological characteristics related to effective performance in combat. These characteristics include the personality resources that training would have to strengthen if it were to increase effectiveness of performance under combat stress.

(2) The development of experimental stress situations that could be used to learn more about behavior under fear-stress. Such experimentally controlled situations could also be used to provide a means for evaluating training procedures directed toward increasing resistance to stress.

(3) The formulation of concepts about how the individual's reactions to a physically threatening job environment might be modified, through training procedures and approaches that would contribute to the resistance of stress.

Previous reports have dealt with work directed toward accomplishing the first two of these goals. This report deals with research toward the third goal. It describes a conceptual model of behavior under stress, developed for use in guiding research into the problems of how, during training for subsequent combat or other hazardous performance situations, the individual's ability to resist stress might be increased.

Summary of the Conceptual Framework

(1) To develop a basis for the conceptualization, the behavioral reactions observed in individuals exposed to prolonged, severe, combat stressor conditions are described. The various reactions occur with remarkable similarity under both combat and various severe noncombat stressor conditions. It is proposed that these reactions can be ordered into phases which, over the course of time, form an observable pattern. This sequential pattern, referred to as a behavioral reaction process, in its general form would develop in any individual during an indefinitely prolonged period of exposure to severe physical harm threats.

(2) The behavioral features of this reaction process are analyzed in terms of the salient stimuli leading to the various reactions. They have been grouped into three successive stages in which effectiveness of combat performance differs:

(a) In Stage 1 the individual is responding primarily to performance or job-centered stimuli.

(b) In Stage 2 he is responding primarily to harm or threat stimuli, and his behavior reflects his concern with the dangers in his environment in place of his earlier job-performance concerns.

(c) Stage 3 is marked by the absence of overt behaviors in response to either job-performance or danger-relevant stimuli.

The progression of the individual's behavior from one stage to the next is assumed to be gradual. In the shift from Stage 1 to Stage 2, for example, danger-oriented behaviors would intrude more and more often and would temporarily block out what had been ongoing job-centered behavior of Stage 1. These intrusions would increase in frequency and duration until the individual's behavior was almost exclusively of the Stage 2 type.

(3) The rate and extent of the changes in stimulus orientation are represented as a function of an ongoing interaction between environmental physical harm threat conditions and certain types of personality resources. Thus, changes in an individual's stressor environment can accelerate, retard, or even reverse the development of this behavioral pattern. In identical environmental stressor conditions, different individuals possessing different strengths of the important personality resources move through these stages of behavioral reactions at different rates.

The internal effects of this ongoing interaction between the individual's personality resources and his stressor environment, described in terms of the resulting shifts in stimulus orientation with their respective accompanying behavioral reaction characteristics, are labeled the "stress process."

The conceptual model (presented in Chapter 3) attempts to render this concept of a stress process experimentally useful by identifying two attitudinal variables as the key personality resource factors. Those opposing attitudinal factors—labeled Confidence and Despair—play major roles in regulating the individual's stimulus orientation to job or danger cues, and hence the rate and extent of development of the stress process.

The *Confidence* attitude is characterized by an anticipation of being able to successfully control one's environment (i.e., to cope with the physical threat aspects in a situation) while the *Despair* attitude is characterized by an anticipation of the impact of the physical threat consequences (i.e., injury or physical destruction). The strength of each of these two attitudes in turn derives from two components: (a) a general component (background confidence, background despair) which is based on the individual's entire history and hence by adulthood is relatively resistant to change, and (b) a specific component (situational confidence, situational despair) which is based on experiences in situations highly similar to a present one and is relatively amenable to change.

An individual's stress resistance is assumed to be a function of the absolute strength of the Confidence attitude (background and situational confidence) and the extent to which this strength exceeds that of his Despair attitude (background and situational despair).

(4) In general, it is assumed that in preparing an individual for combat or other hazardous jobs, training should be considered in terms of the specific or situational confidence and despair components. Training designed to maximize the strength of the situational confidence component and, at the same time, minimize increases in the strength of the situational despair component should result in greater stress resistance when the individual is subsequently in the hazardous job situation.

Implications for Increasing Stress Resistance

The training of specific job skills provides a natural context for increasing stress resistance. It is argued that Confidence and Despair attitudes are affected during any attempt to impart hazardous job skills; however, the manner in which these attitudes are affected may not be in the direction of increasing stress resistance even though job skill acquisition might proceed satisfactorily during training.

Factors in the design of combat skill training that are regarded to be of paramount importance in influencing the simultaneously developing attitudes of Confidence and Despair include the psychological state of the individual during training, as determined by his stimulus orientation and by the intensity of physical harm threat during training.

The major factors in the design of stress-retardant training may be considered in terms of the fidelity (low to high) and form of representation (concrete to symbolic) of stimulus, response, performance feedback, and physical harm feedback elements critical to combat job performance. Amount of practice is also considered an important factor in training design.[1]

To strengthen situational confidence and minimize situational despair in order to improve subsequent resistance to stress in a hazardous job situation, the main conditions necessary, during training, are considered to be:

(1) A relatively high degree of stimulus fidelity for the cues critical to the desired job performance; use of a symbolic form of representation of these critical cues when, for the sake of safety, these cues necessitate special safety procedures which, in turn, degrade the fidelity of the training.

(2) A relatively high degree of response fidelity in the trainee's execution of the performance acts that constitute the hazardous job.

(3) A relatively high degree of fidelity of performance feedback indicating that the responses made would be adequate in the hazardous job.

(4) Repeated practice in the job performance responses, in response to the critical performance cues, with feedback conditions for adequate responses.

(5) Minimization of increases in strength of situational despair (which otherwise tend to be built up to the physical harm cues associated with this training) through use of symbolic forms of representation and, when possible, lesser degrees of fidelity of the physical harm cues. In general, the higher the fidelity for physical harm consequences and the more concrete the representation of the physical harm cues, the greater would be the tendency to strengthen situational despair.

Improvements in training with the goal of increasing stress resistance cannot be expected to render the individual immune to the effects of combat stress. They might, however, be expected to make him less vulnerable to stress during his initial exposure and to increase his effectiveness over a longer period of time.

[1]In developing and evaluating stress-retardant training a capability to assess the strengths of the background and situational components of the trainee's Confidence and Despair attitudes would be a necessary element. Exploratory research at HumRRO Division No. 3 resulted in development of an activities inventory for assessing the background components and a confidence/despair rating for assessing the situational components.

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A Conceptual Model of Behavior Under Stress, With Implications for Combat Training

Chapter 1

THE PROBLEM: IMPROVING EFFECTIVENESS OF BEHAVIOR UNDER STRESS

RESEARCH PROBLEM

The conceptual framework described in this report was developed primarily as a research tool. Its intended use was in studying the problems of how, through training, one might improve an individual's capacity to perform in combat or other stressful jobs.[1]

Virtually every man, woman, and child undergoes some form of training intended to equip him in dealing more effectively with emergencies or other psychologically stressful situations. For example, fire drills are held to train occupants of a building in quick, effective, evacuation procedures in event of a fire. This is training in which escape from danger is the objective.

Where the dangers are identified with usual environmental conditions, such as work or social activities, the objective of the training is to provide techniques which the individual can employ to reduce the risk while still carrying on the danger-related activities. Training in living in Far Northern environmental conditions, in using auto seat belts, and in employing venereal disease prophylactic techniques illustrates the diversity of this type of training.

A third type of training is that given men whose jobs require exposing themselves to danger. Its objective is to prepare them to carry out activities directed toward eliminating or controlling the source of danger—as in the training for firemen, policemen, and combat soldiers.

In spite of the many years of experience in training for hazards, and the broad range of application as illustrated above, there has been only meager development of knowledge about how to design training that will result in effective behavior when the individual meets the hazards. Research and development in the improvement of training has concentrated on the skill-and-knowledge proficiency objective. Virtually no research effort has focused on developing knowledge necessary to expand this training technology to include principles for achieving the stress-retardant objective of training.

The importance of acquiring knowledge of how to increase an individual's effectiveness under stressful conditions, and the lack of research specifically focused on this problem, have been reflected in several reviews of the literature (1, 2, 3, 4).[2]

[1] Improvement in combat performance can, of course, be advanced in other ways. Selection of combat personnel by classification and assignment procedures is one avenue, although it is limited by the size of the available pool of manpower. New equipment may increase the potential fighting effectiveness of the individual infantryman. In conjunction with whatever else may be done, however, the development of improved training plays a continuing role.

[2] In the technical literature the term stress is used to characterize internal processes (psychological/physiological) of a human being or other organism; it is also often used to characterize the environmental conditions that ordinarily bring about internal stress processes. In this report, to distinguish between environmental and internal processes in discussion, the term "stressor" will ordinarily be used in referring to environmental conditions and "stress" will be used to refer to the internal processes.

COMBAT PERFORMANCE UNDER STRESS

The research conducted under Task FIGHTER was a long-range inquiry into the nature of human behavior under severe psychological stress. The ultimate objective of this research effort was the development of possible approaches, through training, to improving the individual's ability to function effectively under the stresses of combat.

The approach taken in pursuit of this long-range objective can be summarized in terms of three major intermediary goals:

(1) The identification of psychological characteristics related to effective performance in combat (5, 6).
(2) The development of experimental stress situations that could be used to learn more about behavior under fear-stress (7, 8, 9).
(3) The formulation of concepts concerning the modification of individual reactions to a physically threatening environment.

The problems that surround the role of the soldier in combat were dramatically spotlighted by S.L.A. Marshall during World War II (10, 11) and again during the Korean conflict (12, 13). Marshall's estimates suggest that during a combat engagement in Korea some 12% to 20% of the men in the unit would be functioning near maximal levels of effectiveness; 25% to 35% would exhibit behavior vacillating back and forth across the borderline level of effectiveness; and 45% to 63% would not be providing any fire support activity.

Officers who commanded troops in Korea have made considerably lower estimates of the percentage of the men in a unit who did not fire their weapons during engagements. Regardless of which estimates are more accurate in terms of combat conditions in the past, the problem of developing ways to improve effectiveness of an individual's performance under combat stress is of central importance in preparing for future needs.

Modern warfare presents a complex pattern of stresses to be considered in training a man for combat. Present-day concepts require that troops be prepared not only to fight but to perform specialized technical activities in combat, and to do so under a wide range of unfamiliar and difficult environmental conditions. Troops may, for example, need to learn to cope with the hazards of performing under extreme climatic conditions. Technical and tactical developments have intensified the demands on the efficiency of the individual's reactions and mental functioning during combat. Improved understanding of the characteristics and limitations of human behavior under severe stress is needed, both for the design of equipment and for the establishment of realistic requirements for new combat jobs so that they can be performed effectively.

Finally, there is the question of the impact that nuclear warfare would have on the effectiveness of combat soldiers. Aside from the potential problem of mass casualties, severe psychological stress associated with threats of mass destruction and radiation exposure would make it very difficult for men to continue to perform effectively even though they were physically able to do so.[1] The possibility that such conditions may have to be faced places a premium on the quality of soldiers' precombat preparation for resistance to stress.

NATURE OF INEFFECTIVE BEHAVIOR IN COMBAT

To gain an understanding of what happens to individuals under the stress of combat, a useful point of departure is provided by comprehensive descriptions

[1]Factors related to the probable impact of nuclear warfare on the combat soldier are discussed in detail in HumRRO Technical Report 65-2, *Human Factors in Tactical Nuclear Combat*, by Robert Vineberg, April 1965.

of combat behavior that was not effective. The fact that a man did not fire his weapon is a dramatic example, but it is not the kind of description that will help determine the probable factors underlying this behavior.

Detailed descriptions of both effective and ineffective combat performance were obtained in a study by the Operations Research Office (ORO) of Johns Hopkins University (14). The investigators collected descriptions of combat behaviors from a total of 1800 infantrymen who had experienced combat in the Korean conflict. The discussion here will be focused on their descriptions of ineffective performance of squad members. The seven types of ineffective behavior most commonly described were:

(1) Forgetting, losing, or discarding necessary equipment.
(2) Talking excessively about danger, fears; becoming hysterical.
(3) "Bugging out."
(4) Failing to check, clean, or maintain weapons or equipment.
(5) Acting in such a way as to reveal the position (by noise, luminous objects, skylining).
(6) Seeking or refusing to leave a position of safety (to fight or move with the unit, carry ammo, deliver a message, take up the assigned position).
(7) Lagging, becoming separated from the unit.

More than half (58%) of the examples of ineffective squad member behaviors collected in this study fall within these seven general areas. The authors point out that "the nature of these areas suggest that the underlying attitudes and motivations of the squad member may be responsible for many of his most common failures."

In an early Task FIGHTER study carried out in Korea, 647 front-line infantrymen identified immediate peers whom they would most like to have alongside in future combat actions and those whom they would least like to have with them (6). Each man was asked to describe incidents from his combat experience that supported each of his choices, both effective and ineffective. To obtain a more complete picture of the kinds of behavior exhibited by men regarded as ineffective fighters, all reports of inadequate combat behavior were listed and categories of ineffective fighter behavior were developed. Under the same conditions of exposure to fire as others in the unit, the ineffective fighter:

(1) Actively withdraws or "bugs out," usually under fire.
(2) Withdraws psychologically:
  (a) Stays in bunker or down in trench when he should be out.
  (b) Refuses direct order to fire at enemy.
  (c) Refuses direct order to evacuate wounded or dead.
  (d) Refuses direct order to move from one position to another.
  (e) Has to be forced at gun or bayonet point to obey an order.
  (f) Freezes.
(3) Malingers:
  (a) Leaves, throws away, or "loses" weapon or gets parts of weapon dirty to make it inoperative.
  (b) Stops fighting when only slightly wounded.
  (c) When he should be fighting, avoids his primary responsibility by carrying supplies or helping wounded buddy.
  (d) Fails to fire at good target for fear of giving away his position.
  (e) Sick (malingering).
  (f) Says he can't take it.
  (g) Malingering in general.
(4) Defensively overreacts; imagines he "sees" and "hears" things, may fire his weapon or throw grenades at "them."
(5) Becomes hysterically incapacitated:
  (a) Trembles to such an extent that he is unable to hold or fire his weapon, or fires wildly.
  (b) Breaks down and cries.
  (c) Is shaky, nervous.

It will be noted that the two studies describe essentially the same behaviors. In general, as the authors of the ORO report stated, these behaviors suggest that the problem lies with the underlying attitudes and motivation of the individuals concerned. Stated another way, the behaviors described are characteristically associated with strong internal states of psychological stress.

Such incidents of combat behavior frequently are interpreted as denoting a high degree of consistency in the relative effectiveness or ineffectiveness of an individual's behavior throughout the duration of his combat experience. This can lead to the impression that combat soldiers consist of two types, the ineffective and the effective, and that from one combat action to another, it is the same individuals who are actively engaged and the same ones who fail to contribute fire support. The problem in this interpretation is that it tends to overlook the influence of environmental conditions and cumulative combat stress upon behavior. The assumption that character or personality traits—presumably stable and unchanging—determine combat effectiveness draws attention away from the influence of factors such as training background, combat fatigue, rotation policies, and the like on a man's ability to resist stress at a given time.

It is important to note that none of the reports cited up to this point has been based on longitudinal observations of men in combat, either in successive engagements or throughout their combat tours. While Marshall does refer to a consistency in an individual's behavior, he also reports on marked increases in fire support during certain types of tactical situations and describes varying consistency with which 25% to 35% of the men take part in fire actions. His descriptions suggest that there is variation in an individual's effectiveness as he defines it (11).

CHANGES IN COMBAT BEHAVIOR, OVER TIME

Observations of a longitudinal nature have been reported by Swank and Marchand (15).[1] These World War II observations will be presented in some detail in order to describe the sequential pattern of behavioral reactions one otherwise has to piece together from diverse sources of cross-sectional observations.

Swank and Marchand emphasize that their description applies to the "average" soldier in the unit under observation. The relatively few men who failed to adjust during the early phase of combat are considered by these authors in a separate discussion. Their description thus is based on the reactions of the majority of the men in a particular unit.

The unit involved was one of those participating in the European invasion. Following its landing it met stiff opposition, and its rate of advance during the first 55-day period of combat was so slow that the situation is described as having been static. Thus, an attempt to trace a behavioral reaction sequence over this 55-day period is not compounded by differing effects from various kinds of action (e.g., extended lulls in combat activity, or periods of rapid victorious advance, or drastic, hasty withdrawal). If there is a discernible sequence of behavioral reactions over time as a function of continuous exposure to a set of severe environmental stressor conditions, these observations under stable conditions should permit its detection.

[1]Permission to use copyrighted material from this article has been granted by the Archives of Neurology, American Medical Association.

These authors identify a pattern in the course of the development of the men's behavior. They break this overall pattern into four successive segments or phases of combat effectiveness: (a) initial combat adaptation, (b) period of maximum effectiveness, (c) hyperreactive phase, and (d) "emotional exhaustion" phase.

PHASE 1: Initial Combat Adaptation

The first phase of reactions in combat is characterized as a period of becoming "battle wise." During this period the soldiers were learning how to adapt to the existing conditions of battle (e.g., discrimination between friendly and enemy battle noises, the caliber and closeness of artillery projectiles, the utilization of cover and concealment, how to spot snipers, smoke and fire discipline at night, a sense of orientation to friendly and enemy positions). It appeared that combat effectiveness of the individual soldier in this particular unit increased in a rapidly accelerating fashion during this initial period.

Swank and Marchand describe the men's reactions in this introduction-to-combat phase as a constant state of fluctuating fear with the various accompanying symptoms including urinary frequency and urgency, intense thirst, anorexia, a fear of eating, a fear of being left alone or of exposing themselves even to defecate, and an increase in sweating. During this initial phase, nearby artillery or mortar fire, for example, would result in almost universal incidence of palpitation, increase in sweating, vaso-motor instability, and tremulousness.

A second type of reactions which made a transient appearance during this acute reaction phase might be described as a narrowing of concern to focus on individual survival. Swank and Marchand describe transient reactions in which the men became selfish to the point that they took food, blankets, entrenching tools, and similar articles from others for their own use. This behavior stopped when the men began to realize that individual survival was dependent upon survival of the group. At this stage, cooperation to the point of self-deprivation became evident and continued throughout the ensuing period of combat.

PHASE 2: Period of Maximum Effectiveness

Swank and Marchand characterize their second phase of reactions, occurring roughly between the 7th and 30th day of exposure in the case of this unit, as the period of maximum combat effectiveness. They report that during this period the elements of "battle wiseness" became almost automatic aspects of the individual's performance.

> . . . Concurrently, the physiologic reactions to danger . . . became modified or controlled to the point that they no longer hindered the soldier in combat. Short periods of overt anxiety appeared from time to time after this in the face of unexpected dangers or developments, e.g., the use of "new weapons" by the enemy, but these rarely developed to the stage that was harmful, and they were soon brought under control again.

This period of maximum effectiveness can be viewed as a time during which the individual's reactions appear to be oriented primarily toward coping with his external environment in a manner that is consistent with the combat mission. His internal environment (i.e., fear-related physiological symptoms and ideational processes), however active it may be, is not playing a

dominating role in determining his overt behavior. However, acute, unexpected incidents can momentarily disrupt this balance even during this period of maximum effectiveness.

Swank and Marchand's observations suggested to them that the early signs of decreasing efficiency begin appearing during the latter half of the period of maximum combat effectiveness. They describe the first symptoms as an "abnormal fatigability, which could no longer be relieved by periods of rest up to forty-eight hours."

PHASE 3: Hyperreactive Phase

With continued exposure the indications merged almost imperceptibly into a successive phase of combat reactions which these authors have labeled the hyperreactive stage. The fear reactions, so apparent in the initial combat reactions and so successfully controlled during the mid-period of the preceding phase, now begin to reappear more frequently and to be quelled with less success:

> . . . Unconsciously, the soldier lost confidence in himself. This was clearly shown in his reactions towards various battle stimuli. He began to lose the fine points of discrimination in which he had prided himself. He no longer could tell the difference between friendly and enemy artillery and mortar fire and referred to all as the fabulous "eighty-eight."
>
> To all these stimuli his reactions became excessive, often to the point that they were harmful. He became overcautious; he stayed close by or in his slit trench whenever possible; he walked rather than rode in a vehicle, so that he would be able to get to cover more readily; and he became a "follower" rather than a leader. . . .
>
> . . . Some degree of irritability also made its appearance. This was shown in mild form by his statements that the campaign was being run poorly and that things in general were not working out as smoothly as they had once. The blame for this was always placed on other units, which he felt were not performing their mission, or on some higher headquarters, which did not "know the score." In more severe form, the irritability consisted in "blowing his top" over matters which at one time would have left him unconcerned. . . .
>
> . . . Sleeplessness became evident early and persisted despite his mounti[ng] exhaustion. If he slept at all, it was during the hours of daylight, because of a greater feeling of insecurity during the hours of darkness. . . .

And again in relation to the mounting anxiety:

> Restlessness was usually present and often became so extreme that he had difficulty remaining in his slit trench even when under fire. Anxiety concerning himself, both directly and remotely, became progressively in evidence during this period; the facies associated with fear and anxiety became progressively more apparent and persistent, and tremulousness came to be ever present.
>
> As the casualties mounted and his old friends became conspicuous by their absence, he was increasingly aware of his dwindling chances of survival, and a feeling of hopelessness became evident. This was expressed by such remarks as: "I guess I'll get mine tomorrow"; "We (meaning the unit) can't keep going like this"; "They'll wipe us out sooner or later," and "I might as well get hit now and get it over with." This evident hopelessness at this point, however, was transient rather than fixed, as indicated by his recognition that should the type of warfare change from static to fluid there would be a chance for survival.

PHASE 4: Emotional Exhaustion Phase

The feelings of hopelessness might have proved transient if the type of combat had changed from static to fluid, but the situation did not change for this particular unit and the behavioral reactions characterized as the "emotional exhaustion" phase began to become apparent. Swank and Marchand have labeled these reactions "emotional exhaustion" in order to emphasize the prolonged, continuous period of combat exposure which preceded their appearance. They consider this exhaustion as a vital factor in differentiating these reactions from highly similar symptoms which, in other cases, may appear prior to combat exposure or after only very short periods of exposure.

The behavioral reactions of this phase are characterized "by a general slowing of mental processes and apathy, in contrast to the hyperactivity and marked anxiety which had been present before." The men became resigned; they perceived the situation as one of absolute hopelessness; "the thought and hope of surviving combat was now foreign; one thing was certain, they would be killed." Officers and NCOs were unable to arouse them from this feeling of hopelessness.

> Symptoms which had been developing insidiously now became evident. The soldier was slow witted; he was slow to comprehend simple orders, directions and technics, and he failed to perform even life-saving measures, such as digging in quickly. Memory defects became so extreme that he could not be counted on to relay a verbal order. There was also present a definite lack of concentration on whatever task was at hand, and the man remained preoccupied for the most part with thoughts of home, the absolute hopelessness of the situation and death. This constant dwelling on death did not indicate a state of fear but, rather, a certainty that it would occur. The anxious stare, together with the tremulousness and generalized hyperactivity was replaced gradually by an emotionless expression, lassitude and listlessness.

The authors further report that in some instances men exhibiting the "emotional exhaustion" syndromes just described were not evacuated. In such cases these symptoms became intensified to the point that the soldier became practically non-reactive both physically and emotionally.

> . . . He could then best be described as one leading a vegetative existence. His facial expression was one of complete apathy: a nonsmiling, rigid-faced person with lusterless eyes. His body was seemingly helpless, movements being performed with an effort. The soldier was in a semi-stuporous state, difficult to arouse from his reverie; he remained almost constantly in or near his slit trench, and during acute actions he took little or no part, trembling constantly.

OTHER OBSERVATIONS OF BEHAVIOR UNDER STRESS

The behavioral reactions sequence just described was observed in a combat situation that exposed soldiers to a relatively continuous, prolonged period of life-threat stressors. Observations made on other units suggest that if, during this exposure, changes in environmental conditions had temporarily alleviated the severity of the threat (e.g., lulls in battle) or provided feedback suggesting success in removing the source of the threat (e.g., rapid, victorious advances in combat), the rate of appearance of the successive phases would have been retarded and possibly temporarily reversed. Similarly, changes in environmental conditions which would intensify the severity of the threat would have been expected to accelerate the rate at which successive phases appeared.

It should be emphasized that the observational and interpretive reports in the military psychiatric literature are not devoted exclusively to the relatively small percentage of men who fail to exhibit any effective performance in combat. To a large extent, the individuals under observation are men who have exhibited effective combat performance; many are men whose histories are indicative of "stable" precombat personality structures.

Additional support for this thesis is evident in references of several writers to the wide range of variability in incidence rates of "combat exhaustion" (the later phases of the reaction process) among different combat units exposed to different stressor conditions. While all of the antecedent conditions responsible may not be clearly identified, there is a relationship between severity of the particular combat conditions and the incident rate (16, 17). Recognition of these facts in the literature has been accompanied by a broadening of observations to include the duration and severity of the individual's combat experience as well as his precombat personality structure.

The discrete behaviors described in the ORO critical incident study and the HumRRO FIGHTER study are similar in nature to the specific behaviors described by Swank and Marchand for the third and fourth phases of combat effectiveness. Thus, in spite of differences in the approaches represented in the three studies, ineffective behavior is characterized in a similar fashion. However, for the purpose of understanding what happens to an individual under severe stress conditions, the sampling of different individuals' behavior at one point in time does not possess the heuristic value of the longitudinal description.

The validity of this behavioral pattern for conceptualizing reactions during exposure to severe life-threat stressors is confirmed in other sources in the literature. Greenson presents a similar sequence of behavioral reactions in describing the course of development of apathy under severe wartime deprivation conditions (18). The observations reported by Lidz on units in the South Pacific during World War II contrast units in which severe deprivations were the major factor with units in which both severe deprivation and life-threat stressors were present (19, 20). Allowing for the expected differences in specific behaviors due to presence or absence of enemy forces, these observations also appear consistent with the general sequential pattern of behavioral reactions described by Swank and Marchand.

Other combat observations, while generally more fragmental in scope, provide a basis for construction of essentially the same pattern of sequential behavioral reactions (21, 22, 23, 24).

Extending review of observations to sources not directly related to combat, we find that other writers have noted the essential identity of the psychological reactions appearing in civil disasters with those appearing in combat (25, 26). A general sequence of behavioral reactions as suggested above can also be constructed via inferences made from the descriptions of reactions to chronic and terminal medical diseases (27, 28), internment in POW camps (29), World War II concentration camps (30), and coercive political interrogation and indoctrination (31).

In reviewing the description of behavioral reactions to these different life-threat and deprivation conditions, it appeared that all might be taken as describing relatively specific behavioral characteristics of a reaction process common to all life-threat and deprivation stressor experiences. The implications of this sequence of behavioral reactions for a concept of the stress process, occurring within the individual, will be discussed later in this report.

MILITARY PROBLEM

Observations of the behavior of individual combat soldiers during combat engagements indicate that:

(1) Behaviors cited as evidence of ineffective combat performance are to a large extent those characteristic of individuals experiencing strong psychological stress states.

(2) Ineffective behavior attributable to stress is not restricted to a small minority of individuals, and its prevalence among a given group of individuals varies with the intensity of the combat stress conditions. Marshall's estimates on proportion of men not fighting effectively are based on a number of different units in specific engagements; combat conditions relevant to intensity of combat stress undoubtedly varied considerably from one unit's engagement to another's. Other writers (e.g., Swank and Marchand, 15) reporting on the basis of longitudinal observations of units have described a positive relationship between incidence of ineffective behavior and intensity of combat stress.

(3) All combat soldiers show a mixture of effective and ineffective behaviors, and changes in the relative dominance of one type of behavior over the other tend to occur in the form of a general pattern as exposure to combat continues. Some ineffectiveness, attributable to stress, occurs in most men during initial combat exposure. Depending upon the strengths of the individual's personality resources, and the severity, frequency, and duration of continuous combat engagements, ineffectiveness tends to decrease in prominence for a period of time after the man becomes seasoned to the combat environment. It then tends to regain prominence, progressing eventually to the point of total incapacitation.

(4) All combat soldiers, rather than only a minority of potentially ineffective fighters, would profit from training for increased effectiveness under stress. Even though personality resources of men within a unit differ, the majority are neither the exceptionally good fighters nor the exceptionally poor fighters. When exposed to more intense or prolonged combat stress, moreover, the effectiveness of all men is subject to at least sporadic states below minimal standards of effectiveness.

Chapter 2

DEVELOPMENT OF A CONCEPTUAL APPROACH

The conceptual framework to be described in this and the following chapter was developed in response to an applied problem—that of developing ways to enhance an individual's capacity to perform effectively under the severe stressor conditions he could be expected to encounter in combat. Applied research ordinarily does not involve developing theoretical frameworks, however relevant such issues may be to the basic psychological problems represented. In this case, however, the environmental stresses the soldier encounters in combat are not simple. Most of the generalizations about what happens to an individual under such conditions are limited to clinical descriptions of the operation of psychological defenses. There is rarely an attempt to make definitive statements about what aspects of ineffective performance can be attributed to psychological threat as opposed to such factors as lack of essential performance skills, or physical exhaustion. The undeveloped nature of conceptualizations of reactions under stressor conditions provides little basis for devising approaches toward strengthening a man's capacity to perform more effectively under stress.

It was therefore considered necessary to develop a conceptual framework that would permit systematic consideration of problems likely to be encountered in trying to identify principles that govern individuals' reactions to environmental stressors. The question of what constitutes effective performance in combat will be considered first. A general concept of behavior under stress will then be described, based on inferences drawn from the sequential pattern of behavioral reactions described in Chapter 1. A specific model or way of accounting for the operation of this stress process will be proposed in Chapter 3. This model will include identification of key "under-the-skin" variables that are assumed to regulate the rate and course of development of the pattern of behavior under stress. Implications of the model for designing stress-retardant training will be discussed in Chapter 4.

AN ANALYSIS OF EFFECTIVENESS OF PERFORMANCE UNDER STRESS

It was clear to Task FIGHTER researchers studying behavior in experimental stress-situation studies (7) that the individual exposed to severe stressor conditions (which in themselves are continually changing) is constantly "maneuvering." He initiates a given response sequence, then interrupts it in favor of an alternative oriented toward the same goal; other response sequences intrude, reflecting pursuit of a different goal (e.g., immediate self-protection versus the performance mission). Ineffectiveness is often not so much a matter of poor performance of a given task as it is failure to even attempt the task.

To find out just how stress affects behavior—and with it, the level of performance—there is need for a detailed, diagnostically oriented system of

observations with data collected during the course of the performance. What range or types of performance behavior should this system of observations take into account?

From a research point of view, there are three somewhat different ways or levels of definition to treat effectiveness/ineffectiveness of performance. The basic problem is whether the individual makes responses directed toward the mission goal; second, assuming he does, whether he employs the desired techniques; third, whether he exhibits a sufficiently high level of skill when employing the desired techniques.

Labeling of behavior as relatively effective or ineffective in any given situation implies that one or all of these three successive criteria are being applied. In making such assessment, however, it is important that the criteria being applied be made explicit.

At the first or basic level, many combat performances are labeled ineffective because they are in no way responsive to the combat mission; for example, the soldier "freezes," refuses to leave his foxhole, attempts to run to the rear, falls out of the attack to aid a wounded buddy, and/or fails to fire his rifle. Behavior that is not oriented toward the required mission goal is automatically classified as ineffective, regardless of any other qualities it may have. Individuals whose responses are oriented toward the goal, whether or not they succeed in attaining it, are exhibiting relatively more effective performance from the viewpoint of the combat commander. The majority of the ineffective behaviors described in the Korean war studies cited earlier are identified as ineffective on the basis of this criterion.

At the second level, relative effectiveness may be judged against a criterion of whether the individual's response represents a choice, from among those available, of the most likely mode of approach to the mission goal. To be effective on the first criterion, the individual must simply attempt to respond to the mission goal. To be maximally effective at this second level, he must not only respond but his choice of response must represent the best available method of achieving the goal. In performance measures based on level 2 criteria, lack of motivation to respond to the goal is confounded with many diverse factors that cause the individual to choose a less-than optimal approach to the mission goal. While one can find examples of combat ineffectiveness based on this criterion (e.g., failure to switch weapons and utilize an available weapon peculiarly suited to the particular terrain or type of enemy emplacement), they are not nearly so common as those cited in connection with the first-level criterion.

Finally, judgments of performance may be refined further by imposing a third-level criterion, rating relative effectiveness according to the efficiency and/or accuracy with which the responses involved in the adopted mode of approach to the mission goal are executed. To be maximally effective, the individual must have identified and attempted to respond to the mission goal (level 1), his response must reflect the most likely or "correct" mode of approach to this goal (level 2), and he must be efficient or accurate in carrying out the responses involved in this mode of approach (level 3). Accuracy of rifle fire in a perimeter defense situation might be an example of behavioral evaluation at this third level. There is little information in descriptive literature illustrating ineffectiveness of combat performance at this level of behavioral evaluation. Performance measurement based on this level confounds motivation to respond to the mission goal, choice of response or mode of approach, and the many diverse factors that can influence efficiency and accuracy on a given task.

Any of the three levels of criteria could be used to study the effects of stress on performance:

(1) Level 1 criteria are appropriate to studies of goal choice or goal orientation behavior. If the focus is on level 1 criteria, recording of behavioral observations must be relatively continuous during the stressor experience and the behaviors observed must be broadly defined so as to permit identification of changes in goal orientation as well as continued adherence to the designated goal.

(2) Level 2 criteria would be appropriate for studies of the effects of stress on job-related problem solving, risk taking, or decision making. Here the concern is specific to those who do respond to the designated goal and the factors which influence their choice of a particular mode of approach to this goal.

(3) Level 3 criteria, dealing with the efficiency with which a particular mode of approach performance is carried out, would be appropriate for studies of the effects of stress on particular psychological functions; the exact ones would depend on those the task (representing a mode of approach) is designed to measure. While it is not always clear that this has been consistent with their objective, most of the traditional laboratory stress studies have utilized level 3 criteria.

The descriptions of behavior in combat make it clear that level 1 criteria reflect an important segment of ineffective combat behaviors. Since the other levels are applicable only if the man is effective at level 1, it was decided to focus primarily on level 1 criteria in developing the initial approaches to the applied problem.

AN ANALYSIS OF THE BEHAVIORAL REACTION PATTERN

The review of descriptions of behavioral reactions to various kinds of severe life-threat conditions revealed essential similarities among the patterns of specific reactions. There appeared to be relatively specific behavioral characteristics of a reaction pattern common to all life-threat stressor experiences.

It is assumed that this behavioral reaction pattern occurs as a function of interaction between environmental factors and what, for the present, may be labeled individual resource factors. Both rate and regularity of development of this behavioral reaction pattern presumably will be affected by relevant changes in factors in the stressor environment (e.g., as the threat becomes more imminent or recedes). For purposes of this analysis, we will assume the individuals are in a job-relevant situation, such as a combat infantryman might be, where the life-threat stressors are severe and are present in a relatively continuous fashion for an indefinitely prolonged period of time. Also, since there are important individual differences in the rate at which this behavior reaction pattern develops, it will be assumed that the individuals exposed possess individual resources of at least good quality.

The behaviors reported in the literature appeared to fall into three sequential types. The initial type of behavior exhibited can be generally characterized as a job-oriented behavioral phase. There is a gradual transition to a second type characterized here as a danger-oriented phase. These behaviors, in turn, gradually give way to a phase where there is minimal overt behavior of either of the first two types. This we characterized as a behavioral decline phase.

In considering these behavioral phases to see whether they were compatible with the observations, it appeared conceptually useful to move backwards from

the behaviors to inferences about the classes of stimuli or cues that would ordinarily be expected to elicit the given type of behavior. The result of making these conceptual inferences is three sequentially arranged classes of behavior, each corresponding to a different class of stimulus cues or, as it will be termed here, a different stimulus orientation. The observational data are re-presented below in terms of this general stimulus-behavior schema.

Stage 1

Stimulus Orientation: *External cues associated with control or manipulation of the environment.*

Class of Behaviors: *Job performance-centered behaviors.*

Stage 1 of this schema includes both of Swank and Marchand's first two phases, "initial combat adaptation" and "period of maximum effectiveness." The initial part of Stage 1 is a learning phase. The soldier coming into combat for the first time still has to learn how to apply much of what he was taught in training, and probably many sorts of things he was not specifically taught. He is experiencing fear but he is also learning to discriminate important cues from unimportant ones and how to carry out the performance expected of him while minimizing his exposure (e.g., he becomes able to differentiate types of weapon fire, as well as friendly and enemy fire). As this cue discrimination and performance learning progresses, the sporadic outbursts of fear behavior become less frequent and mission-oriented performance is initiated and maintained in a relatively smooth and efficient manner.

Cue discrimination begins early. The occurrence of obvious behavioral responses (e.g., palpitation, trembling) correlated with the occurrence of danger cues in the environment begins to diminish. As learning progresses, the overt fear responses become notably less frequent and generally occur only in response to hitherto unexperienced conditions. Thus, while short periods of orientation to external danger cues may intrude, in the main the learning which takes place shows that the man's stimulus orientation is directed toward discovering and responding to cues relevant to control or manipulation of his environment in ways consistent with his training and mission.

After a period during which the man's behavior is closely attuned to combat job cues in the environment, lapses in responses to job performance cues begin to appear. As time in combat continues, these lapses become more frequent and last longer. This, while still classed in Stage 1, represents the beginning of the transition into Stage 2. Under stalemate combat conditions, the individual begins to discover that his performance is not notably potent in producing the intended effects upon the environment. His stimulus orientation begins to fluctuate back and forth between the job-related manipulanda cues and the external danger cues. He takes longer to recover from the occasional unexpected or novel danger stimuli and pick up his performance again. He appears to gradually lose his ability to make the cue discriminations at which he had earlier been proficient; he begins to respond to cues of danger and other stimuli with manifest anxiety or fear responses.

The apparent deterioration in the quality of combat cue discrimination is seen in the present schema as a function of the fluctuating shifts in the man's stimulus orientation, with increasingly longer periods of time being commanded by other cues—the danger cues being salient in Stage 2. Not only has he gradually begun to focus more on the occurrence of danger stimuli in his environment (external danger cues), but he has also begun to respond to his anticipations of what the consequences of these danger stimuli might be for him

(internal anticipatory damage cues), whether or not particular external danger cues are currently present in his environment.

The responses elicited under this stimulus orientation are, in many instances, different from the responses appropriate to his combat mission and tend to be incompatible with them. That is, ordinarily he cannot carry out both types of responses at the same time. Further, in certain cases at least, external cues that should lead to combat mission responses are sufficiently separate and distinct from external danger cues that a man oriented to danger cues is not even aware of the mission performance cues.

Stage 2

Stimulus Orientation: *External danger stimuli and internal anticipatory damage stimuli.*

Class of Behaviors: *Danger-oriented behaviors.*

The individual is considered to have entered Stage 2 when his responses are predominantly to danger-oriented cues rather than the performance-centered type.

The individual entering Stage 2 begins to perceive himself as being in a situation which he and his buddies cannot directly do anything about. He feels trapped; he is likely to blame other units and higher headquarters for the situation. As he sees it, his control and manipulative responses have had no apparent decisive effect; he sees little evidence that conventional sources of support are going to come in and help him out. With this he begins to see the dangers as the important part of the environment that he and his buddies are going to have to live with indefinitely—if they live.

His behavior changes as though he is now "settling in" and anticipating acute occurrences in order that he (and his buddies) may avoid the consequent death or injury. He concentrates more and more on the threat environment as it is experienced in the form of internal stimuli (anticipations, feelings, bodily sensations), as opposed to the threat as it is represented by the environmental stimuli. The predominant nature of these internal cues can be characterized as anticipation of death or injury.

As the shift in orientation to these cues progresses, the nature of the most likely response consequently also changes. These responses are, in general, those that would be appropriate to stimuli associated with a strong likelihood of immediate death or injury. Thus, the man becomes "jumpy" or "trigger-happy"; he responds to anticipations rather than to what would normally be considered relevant environmental danger cues. He is excessively over-cautious (the behavior to be expected as he begins to focus predominantly on the anticipatory damage cues of the internal stimulus environment). For example, he stays in his slit trench whenever possible; he walks rather than ride in a vehicle so he will be closer to cover.

His preoccupation with internal cues tends to compromise his ability to be aware of subtle differences in environmental cues that might be vital to combat mission performance, or even those directly related to threat to himself or his buddies. He has increasing difficulty in sleeping when opportunities arise. As time wears on, and probably aided by cumulative fatigue, he exhibits signs of feelings of hopelessness of ever getting out alive.

Stage 3

Stimulus Orientation: *Internal anticipatory damage stimuli.*

Class of Behaviors: *Decline of both job performance-centered and danger-oriented behaviors.*

The feelings of hopelessness and the near domination of the man's behavior by his apparent acceptance of his own anticipations of danger as cues for determining his behavior mark the transition into Stage 3. As in the shift from Stage 1 to Stage 2, this is not an abrupt change from the hyperactivity of Stage 2 to the unresponsiveness of Stage 3. Rather, over time, the more unresponsive behavior intrudes into the hyperactive both more often and for longer periods.

In this stage, the individual's focus on his internal, anticipatory, death-or-severe-injury "stimulus environment" becomes gradually more exclusive in nature. He appears to become increasingly withdrawn from the environment, is preoccupied and slow-witted, and fails to take cover. He dwells on death, not with evidence of fear but rather in apathetic certainty that it will occur.

This shift in stimulus orientation virtually completes the withdrawal of attention from the environmental manipulatory and danger stimuli as they exist and change from point to point in time. This removes the source of any contrast between the man's current possibly uninjured state and his anticipated death or injury state. The internal stimuli related to these latter anticipations become his stimulus environment; his feelings of hopelessness and his certainty that he will not survive become increasingly fixed, and he ceases to make any overt struggle against the objective, external environment. If conditions persist unchanged, he might even eventually die (29), presumably because of physiological changes which accompany or are set in motion by these intense internal anticipatory damage responses.

In the extreme form of this third phase, then, the intense internal anticipatory damage responses become subjectively indistinguishable from the sensations associated with actual damage inflicted by environmental assault. In other words, the individual's anticipations—while to an objective observer still representing anticipations—have come to represent current reality to the individual, and he responds to them accordingly.

Chapter 3

A CONCEPTUAL MODEL OF THE EFFECTS OF STRESSFUL SITUATIONS ON THE INDIVIDUAL

This conceptual model represents a theoretical description of internal psychological factors and their mode of operation in governing individuals' behavioral reactions in stressful environmental situations. The purpose of this theoretical model is to provide a basis for formulation of testable hypotheses regarding the effects training must have on individuals if it is to enhance their resistance to future stressful situations.

AN OVERVIEW OF THE MODEL

Basic Propositions

An internal stress process is postulated. This process is a result of continuing interactions between individual resources and the physical harm stressor environment.

"Individual resources" encompasses a wide range of capacities including physical stamina, muscular control, sensory organ functioning, intelligence, and attitudes, to mention only the more obvious. Attention for purposes of the model is centered on two key regulatory factors, attitudinal variables governing the nature of the reaction of the individual to a stressful environment. The effects of other individual resources in the stress process may be viewed as occurring indirectly, through their effects on the regulatory attitudes.

The model deals with reaction to physical harm threat. Threat of physical harm is, of course, not the only disturbing element in combat and other severe stressful environments. The other kinds of disturbing elements present in such situations (e.g., exhaustion, isolation from the soldier's primary group, poor leadership, "Dear John" letters) are assumed to exert their influence in one of two ways: (a) increasing vulnerability to physical harm threat, or (b) changing individual resources and, in turn, affecting the strengths of the two key regulatory variables.

The stress process represents a progression of internal changes occurring in all physical harm threat stress situations.

The external manifestations of these internal changes are described in the preceding chapter as the behavioral reaction process. The internal changes are conceived as alterations in the strengths of the regulatory variables which, in turn, bring about the stimulus orientations that characterize the three stages of the stress process. The rate and regularity of internal changes vary from situation to situation as a function of the physical threat environment. For example, changes in imminence of threat, severity of consequences, or the

prospect of future exposures could—depending on the nature of the change—accelerate, arrest, or reverse the course of the stress process.

> *The full progression of internal changes and their manifestations in performance would occur in any individual if he is exposed long enough to physical harm threat conditions.*

More simply, no one is superhuman, although internal changes occur at a faster rate in some individuals than in others. There are differences among individuals in the rate of development of the stress process, reflecting individual differences in the regulatory attitudes. However, in any sufficiently extended physical harm threat situation in which the individual has a predefined job role, the progression of changes shown in the Stage 1 to Stage 2 to Stage 3 sequence is to be expected.

> *The individual's stress resistance in any given situation is defined as the rate of development of the stress process in that situation.*

If a given environmental stress situation were abruptly terminated after a standard duration of exposure for all individuals, we would expect to find individuals reflecting a range of stages in the developmental course of the stress process. If the situation had been (objectively) standard for all subjects, the rate of individuals' stress development would serve as an index of stress resistance in this situation, and the stage of development at the end of this period of exposure would reflect the severity of the stress induced up to that point in time.

Critical Individual Resources

The findings in FIGHTER I (5, 6) regarding the differences between the interests and past history of activities of "fighters" and "nonfighters" served as a point of departure for conceiving the key individual resource variables.[1]

It was hypothesized that the individual resources of direct relevance to stress resistance in combat are those that develop over the course of the individual's life experiences in physical harm threat situations. These individual resources are conceived as two opposing attitudinal factors, called Confidence and Despair, and refer solely to situations in which there is threat of physical harm.

The Confidence factor is an attitude developed on the basis of incidents in physical harm threat situations where the threat was controlled or eliminated by actions the individual took to cope with it. This attitude is experienced as an anticipation of being able to change the environment and, thereby, neutralize or eliminate threat.

It is proposed that there are two components to each of these attitudes:

(1) A general—or background—component, with strength based on all past experiences, which remains essentially the same from one type of situation to another. It will be referred to as background-confidence or background-despair. This background component is very resistant to change by the time an individual is in his late teens or early twenties.

(2) A specific—or situational—component, which varies in strength in different situations. The strength of this component for a given situation

[1]Findings of FIGHTER I were subsequently used in the development of combat selection devices by the Personnel Research Branch, U.S. Army Adjutant General's Office (32).

depends upon the nature of the individual's past experiences in that kind of a situation (or in highly similar ones). The specific components will be referred to as situational-confidence or situational-despair.

The strengths of the specific components—situational-confidence and situational-despair—are responsive to the nature of the individual's ongoing experience in a specific situation. For example, evidence from the environment that instrumental responses are failing to neutralize or terminate the threat (negative feedback) weakens situational-confidence. Evidence of success (positive feedback) strengthens situational-confidence. Changes in the environment that increase imminence or severity of threat (e.g., a sudden artillery barrage) strengthen situational-despair. Conversely, changes of the opposite kind lessen situational-despair.

Ordinarily, in most combat situations weakening in situational-confidence and strengthening in situational-despair are closely associated. However, this is not necessarily the case since changes in these components occur as reactions to somewhat different factors in the ongoing stressor environment. It is even possible for increments in both situational-confidence and situational-despair to occur simultaneously. The reason for this, and descriptions of the processes, will be made more explicit in the presentation of the model.

The Confidence and Despair attitudes (combined background and situational components) are conceived as mutually incompatible internal, anticipatory responses. Within this frame of reference, one or the other of these two attitudes must be the predominant influence in the individual's reaction at any time. These attitudes include stimuli internal to the individual. Each one makes a particular, different set of response hierarchies available and, in effect, excludes others, by bringing about orientation to a particular category of cues or stimuli.

Thus, at any given point in time, behavior under stress would be described as characteristic of either the "Confidence state" or the "Despair state." The third stage of the stress process described earlier represents an extreme development of the "Despair state."

Because of the effects of the Confidence and Despair attitudes in regulating stimulus orientation, an individual's resistance to stress depends upon the relative and the absolute strengths of these two attitudes. The relative strengths determine which attitudinal factor, Confidence or Despair, is dominant at any given time. The strength of the one that is dominant influences the strength of the stimulus orientation.

Development of the Model

The model of the stress process was developed in order to provide a framework that would facilitate synthesis of information collected on individuals' reactions to severe stress experiences. The clinical insights, field and laboratory observations, and theoretical formulations of clinicians and experimental psychologists representing divers frames of reference were all considered important to this effort. Under this influence, development of this model quickly diverged from relatively simple elaborations of any single, existing theoretical formulation.

A special debt of acknowledgment is due a number of investigators. The hypotheses developed by Janis in his work with patients undergoing surgery had considerable influence on the thinking regarding the functional role of the psychological variables involved in behavior under stress (33). In attempting to make the resulting concepts and their interrelationships more explicit, the

author's approach was strongly influenced by the theoretical formulations of Hull (34, 35) and Mowrer (36, 37).

The considerations that guided development of the model can perhaps best be indicated by characterizing it as a clinical-experimental model. In general structure, it reflects Mowrer's definition of a two-factor theory (36).

The model is an S-O-R model. It seeks to account for the development of internal (O) factors that act to regulate the stimuli (S) to which the individual is oriented and thus plays an important role in determining the types of response (R) behavior he will exhibit during given segments of time. These internal factors are labeled Confidence and Despair. While they have some similarity to Mowrer's concepts of "hope" and "fear," there are important differences. In addition to their stimulus orienting function, the Confidence and Despair factors account for consistency from situation to situation in a person's behavior and also account for departures from the individual's modal style in specific circumstances. From this point of view, this model represents a relatively circumscribed approach to the problems discussed by White in his initial proposal of the concept of competence (38).

The remainder of this chapter is an intermixture of detailed and summary expositions of the concepts comprising the model. For the reader who is not concerned with technical details, the summary portions (in the larger type size) provide background for Chapter 4, in which this conceptual framework is applied to stress-retardant training.

A MODEL OF THE STRESS PROCESS: Development and Characteristics of Despair and Confidence Attitudes

The conceptual structure underlying the model will be presented from a developmental point of view.

Before the young child develops either the Confidence or the Despair attitude postulated by this model, he must have learned certain elementary internal responses. Acquisition of these elements will be discussed first; acquisition of the Despair attitude will then be described, followed by acquisition of the Confidence attitude.

Elements Preceding Development of Confidence and Despair

Classes of Environmental Stimuli

In the environmental stimulus complex (represented in Figure 1 by the symbol S_{env}) we distinguish, for our purposes, two classes of stimulus events:

Manipulanda stimuli (S_M)—stimuli that, through learning, elicit instrumental responses to control or reduce physical harm threats. (These stimuli will be of primary importance in the acquisition of the Confidence attitude).

Physical harm stimuli (S_T)—stimuli that have been associated either directly (as unconditioned stimuli) or indirectly (as conditioned stimuli) with the actual infliction of physical harm.

Internal Damage Response ($r_D s_D$)

Physical harm stimuli (S_T) (those describable as unconditioned stimuli acting directly on the individual, e.g., fire, electric shock, bright lights, loud noise) produce a physiochemical/physiomechanical response with accompanying internal stimulation which we have termed the internal damage response ($r_D s_D$).

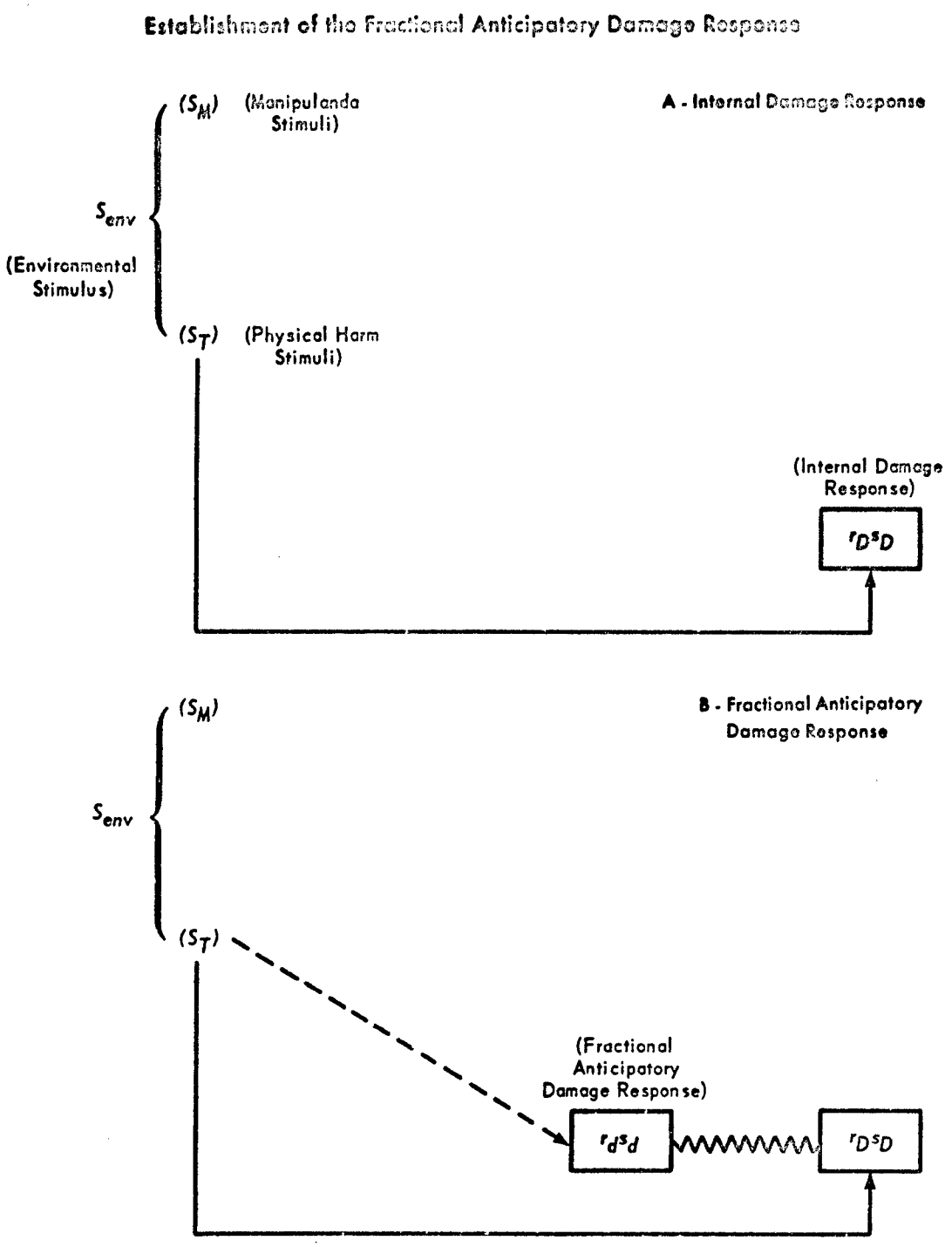

Figure 1

The unconditioned nature of this internal response is denoted by the capital letter (*D*, signifying damage) in the subscript of the symbols standing for the internal damage response (Figure 1A). The internal damage response is assumed to have stimulus properties of two types—intensity and quality. The cue property of quality, for example, includes cue differences associated with differences in sensory modalities.

Fractional Anticipatory Damage Response ($r_d s_d$)

After several occurrences of the (unconditioned) internal damage response ($r_D s_D$) to the same or highly similar physical harm stimuli (S_T), a fractional anticipatory damage response is learned as illustrated in Figure 1B. This is a conditioned response (denoted by the lower case subscript used–$r_d s_d$) to the cues (conditioned stimuli) associated with physical harm stimuli (unconditioned) (S_T).[1]

The associative strength of the fractional anticipatory damage response to the physical harm stimuli depends upon the number of times the given set of physical harm stimuli has actually produced the internal damage response ($r_D s_D$), the intensity of the stimulation in each occurrence, and the amount of stimulus-response generalization from other similar occurrences of physical harm stimuli and internal damage responses.

The fractional anticipatory damage response is assumed to have stimulus properties of two types–intensity and quality. It is assumed that the intensity of stimulation (s_d) produced by the occurrence of a given anticipatory damage response (r_d) is roughly proportional to the strength of the associative bond between this response and the environmental cues (S_T). While the initial establishment of the fractional anticipatory damage response depends upon the occurrence of the (unconditioned) internal damage response, once the anticipatory damage response is established it is extremely resistant to extinction because of its own production of internal stimulation (s_d). The stimulus properties based on quality permit (whether or not on a subjective level of awareness) discrimination to be made among different kinds of anticipatory damage responses. These discriminations would be expected to be in terms of the general identity of the parent internal damage response ($r_D s_D$).

The assumptions regarding this type of internal response–that is, anticipating personal damage–are as follows.

(1) Direct physical harm to an individual produces an internal physiochemical/physiomechanical response, referred to as the "internal damage response." This response has stimulus properties that differ from one another in strength and kind depending on the nature of the physical harm stimuli.

(2) After repeated occurrences of internal damage responses to particular physical harm stimuli, those stimuli tend to elicit a part of the internal damage response. This portion is elicited in anticipation of damage and is termed a "fractional anticipatory damage response."

(3) The likelihood that an anticipatory damage response will be elicited by a physical harm stimulus depends on how often an internal damage response has been associated with those stimuli and how intense the internal damage responses have been.

(4) The intensity of an anticipatory damage response depends on how strongly it is associated with physical harm stimuli.

(5) After there has been some minimal strength of association between an anticipatory damage response and physical harm stimuli, the association is highly persistent even without being strengthened by recurrences of the initiating physical harm threat - internal damage response pattern. This persistence results from association of the internal stimulation produced by the anticipatory damage response itself with the physical harm stimuli.

Physical Harm Threat Response ($r_{ph} s_{ph}$)

In the course of an individual's development he experiences a variety of environmental harm threat stimuli (S_T) which result in a corresponding variety of internal damage responses ($r_D s_D$). These in turn lead

[1] The fractional anticipatory damage response is a component of the internal damage response and hence is not "capable" of eliciting it. This kind of relationship is denoted in Figure 1B, and in other figures, by a solid wavy line.

to the establishment of different fractional anticipatory damage responses ($r_d s_d$) having varying degrees of similarity.

After these different anticipatory damage responses ($r_d s_d$) become established, a "higher order" fractional anticipatory damage response is subsequently established (Figure 2). This has been labeled the "physical harm threat response" ($r_{ph} s_{ph}$). It is described as a higher-order anticipatory response because it represents common response and stimulus elements occurring in all anticipatory damage responses ($r_d s_d$). In effect, it represents a highly generalized version of all of the anticipatory damage responses in the individual's response hierarchy.[1]

As will be noted in Figure 2, the development of the physical harm threat response ($r_{ph} s_{ph}$) depends upon the elicitation of the anticipatory damage responses ($r_d s_d$) by physical harm cues (S_T). Before physical harm cues can elicit the physical harm threat response, they must have acquired the capacity to elicit anticipatory damage responses. The associative connection between specific physical harm cues and the physical harm threat response will be strengthened by the occurrence of any anticipatory damage response. The size of the increment will be determined by the combined intensity of the anticipatory damage responses present. Thus, even though anticipatory damage responses must be established first, it is possible for the associative strength between specific physical harm cues and the physical harm threat response to be greater than the associative strength between the same physical harm cues and any given anticipatory damage response.

Establishment of the Physical Harm Threat Response

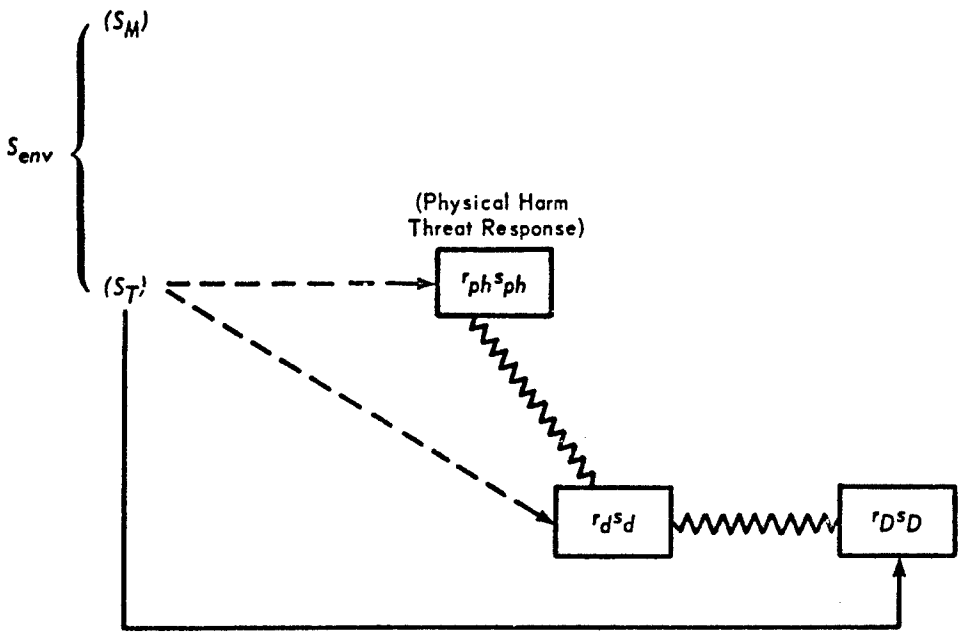

Figure 2

The assumptions regarding the development of the physical harm threat response may be summarized as follows.

(1) There are common elements in all internal anticipatory damage responses. These elements become associated with whatever physical

[1]The "derived" relationship (indicated by a solid wavy line) between the physical harm threat response and the anticipatory damage response is shown in Figure 2; the physical harm threat response has no capacity to elicit anticipatory damage responses.

harm cues are present. The resulting association is a "higher order" fractional anticipatory response, and has been labeled the "physical harm threat response."

(2) The associative strength between particular physical harm cues and the physical harm threat response depends on how often anticipatory damage responses have occurred to the physical harm cues and on the intensity of these responses. For any incident, the size of the increase in the strength of the physical harm threat response depends on how many anticipatory damage responses are present and on their combined intensity.

(3) The intensity of internal stimulation produced by the physical harm threat response is roughly proportional to the strength of its association with the particular physical harm stimuli.

Establishment of the Despair Attitude

Thus far, the following assumptions have been made.

(1) Physical harm stimuli, by direct assault on the individual, elicit internal damage responses. The stimulus characteristics of these responses are illustrated by the internal stimulation produced by such things as bruises, cuts, broken bones, loud noises, and bright lights, and is the basis for the establishment of anticipatory damage responses.

(2) Environmental cues that have been associated with the unconditioned physical harm stimuli acquire the capacity to elicit internal, anticipatory damage responses. That is, the individual responds in anticipation of specific types of possible harm or injuries in specific situations.

(3) The occurrence of anticipatory damage responses to the physical harm cues leads to the establishment of the physical harm threat response: The individual begins to experience a general anticipation of danger in different situations even when he can not identify specific types of harm or injuries that might be involved.

The development of the anticipatory damage responses and the physical harm threat response provides the basis for the establishment of the Despair response.

The Despair response ($r_y s_y$) is a "higher order" fractional anticipatory response derived from response elements common to all internal damage responses ($r_D s_D$). The strength of this Despair response is a joint function (see Figure 3) of the associative bonds with the two stimulus sources, that of the physical harm threat response (s_{ph}) and that of the specific anticipatory damage responses (s_d).

In the overview of the model earlier in this chapter, it was stated that the strength of the Despair attitude is based on the combined strengths of a *background* component and a *situational* component. The associative connection between the stimulation produced by the physical harm threat response (s_{ph}) and the Despair response ($r_y s_y$) represents the background component. We will first consider the establishment of this associative connection.

The Background Component. It is assumed that, when an internal damage response ($r_D s_D$) occurs in the presence of the physical harm threat response ($r_{ph} s_{ph}$), this strengthens the tendency for the internal cues (s_{ph}) produced by the physical harm threat response to elicit a component of the internal damage response common to all internal damage responses—that is, the Despair response ($r_y s_y$), a general anticipation of the occurrence of physical harm. How much this association is strengthened depends upon both the intensity of the threat response stimulation (s_{ph}) present at the time and the intensity of the stimulation (s_D) produced by the internal damage response.

It is to be noted that the associative strength of this connection between physical harm threat response stimuli (s_{ph}) and the Despair response is a cumulative function of *all the individual's past*

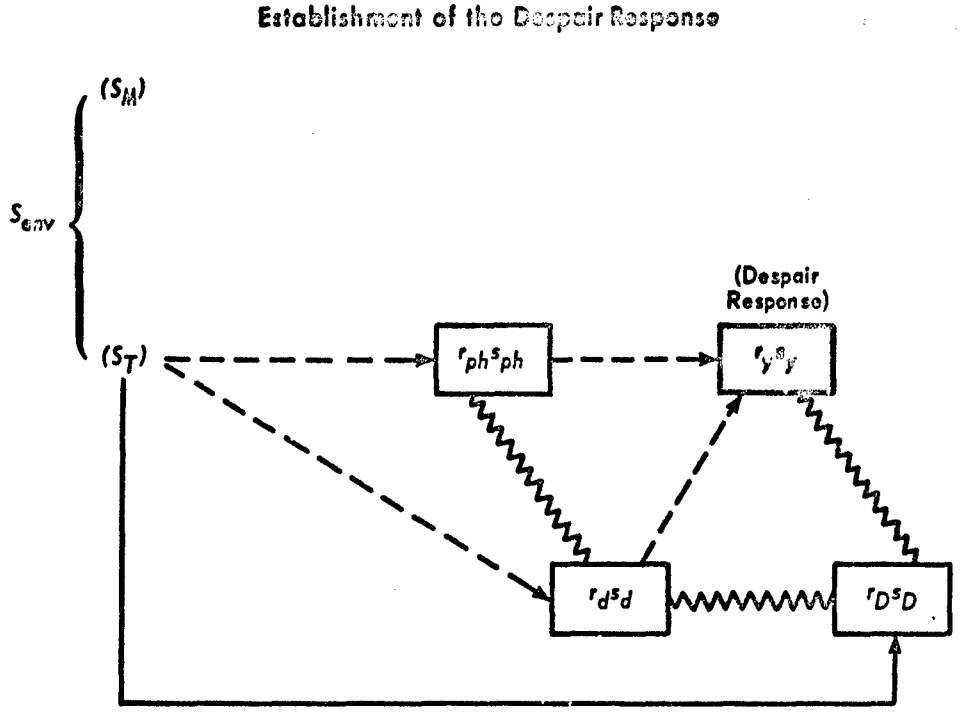

Figure 3

experiences involving the occurrence of any internal damage response ($r_D s_D$) in the presence of the physical harm threat response ($r_{ph} s_{ph}$).

Different physical harm stimuli (S_T) do acquire different strengths of association with the physical harm threat response ($r_{ph} s_{ph}$). While this results in different intensities of the stimulation produced by the physical harm threat response (s_{ph}), this stimulation does not vary from situation to situation in terms of quality. Thus, in effect, the physical harm threat response is always the same response, differing only in its associative strength from one situation to another.

A similar set of assumptions is made regarding the Despair response, which is a component common to all internal damage responses ($r_D s_D$). The eliciting stimulus for the Despair response is the cue quality produced by the physical harm threat response ($r_{ph} s_{ph}$). Hence, if the individual is in situation A which elicits the physical harm threat response, and if under these conditions an internal damage response ($r_D s_D$) occurs, there would be an increment to the associative bond between the stimulus for the physical harm threat response (s_{ph}) and the Despair response. If he were then to move to an entirely different physical harm stimulus (S_T) situation, with a different internal damage response, there would simply be a second increment to the strength of the Despair response. Now if he went into a third physical harm stimulus situation, the strength of the physical harm threat response elicited might differ from that elicited in either situation A or B. However, the strength of the association between the physical harm threat response stimuli (s_{ph}) and the Despair response would initially be equal to whatever strength had accumulated over all prior experiences including situations A and B.

Thus, every time any internal damage response ($r_D s_D$) occurs in the presence of a physical harm threat response ($r_{ph} s_{ph}$), there will be an increment in the tendency for the internal threat response cues (s_{ph}) to elicit the anticipatory Despair response ($r_y s_y$).

The Situational Component. The second of the two associative bonds that determine the strength of the Despair response ($r_y s_y$) is the connection established between specific anticipatory damage responses

(i.e., their cue components, s_d) and the anticipatory Despair response. These connections represent the situational component of the Despair attitude.

The establishment and strength of the situational component of the Despair response (s_y) is a function of the frequency with which specific anticipatory damage responses ($r_d s_d$) have been present at the time of occurrence of the internal damage response ($r_D s_D$). The degree of strengthening of the associative bond between the cue properties of a specific anticipatory damage response and the Despair response depends on the intensity of stimulation produced by both the anticipatory damage response ($r_d s_d$) and the internal damage response ($r_D s_D$).

The contribution of this situational component to the strength of the Despair response, at any point in time, depends on the combined associative strengths between the anticipatory damage responses present (i.e., their stimulus components, s_d) and the Despair response. In a situation posing a relatively limited range of stimuli (e.g., going to a dentist to have a tooth pulled) the number of anticipatory damage responses elicited would be small as compared to the number one might expect in a situation posing a broader range of physical harm stimuli (e.g., combat).

Changes in the number of anticipatory damage responses present at one time would, in general, be expected to influence the strength of the Despair response. Thus, changes in physical harm stimulus (S_T) conditions that increase the number of anticipatory damage responses present (having already established connections with the Despair response) will increase the strength of the Despair response. Conversely, a partial or complete removal of physical harm stimuli from the environment would decrease the number of anticipatory damage responses present and, hence, result in a decrease in the strength of the Despair response for that period of time.

The assumptions made regarding the establishment of the Despair attitude are summarized as follows.

(1) An internal damage response in the presence of internal stimulation resulting from the physical harm threat response establishes a tendency for this stimulation to evoke a "higher order" fractional anticipatory response labeled the Despair response. This Despair response represents response aspects common to all internal damage responses.

(2) Increases in the strength of the association between the physical harm threat response stimulus and the Despair response depends on the intensity of the physical harm threat response and the intensity of the internal damage responses present at the time. Since the cue properties of both the physical harm threat response and the Despair response differ from situation to situation only in terms of intensity, increases in the strength of the association between them will accumulate and carry over to all situations in which the physical harm threat response is elicited. This association represents the background component of the Despair attitude.

(3) There can be no strengthening of the association between the physical harm threat response stimulus and the Despair response in the absence of an internal damage response.

(4) Specific anticipatory damage responses that are present at the time of occurrence of an internal damage response will also acquire the tendency to elicit the Despair response. The strength of this tendency will depend upon how often they have been associated, and how intense the stimulation produced by the internal damage response has been. This association represents the situational component of the Despair attitude.

(5) Since the specific anticipatory damage responses present will tend to differ in different situations, the strength of the Despair response due

to associative connections with these responses will vary from situation to situation.

(6) The strength of the Despair response will be a joint function of the strengths of its associative connections with (a) the physical harm threat response cues and (b) the anticipatory damage response cues.

(7) The intensity of the internal stimulation produced by the Despair response is directly dependent on the strength of that response.

Establishment of the Confidence Attitude

The Confidence response is a higher order anticipatory response. It is established in a physical harm threat situation by events different from those that lead to the Despair response.

In a pattern similar to that of the Despair response, the strength of the Confidence response depends on the strengths of two types of associations: one is the capacity of the physical harm threat response cues to elicit the Confidence response (background component), and the other is the capacity of the anticipatory manipulative response cues to elicit the Confidence response (situational component).

The Background Component. The Confidence response ($r_x s_x$) represents an anticipatory version of a common internal response present whenever a reduction occurs in the intensity of the stimulation (s_{ph}) produced by the physical harm threat response ($r_{ph} s_{ph}$). With repeated occurrences, this anticipation of threat reduction (the Confidence response) comes to be elicited by the physical harm threat response cues (s_{ph}). This associative connection has been labeled the background component of the Confidence response since it accumulates strength over such occurrences, regardless of differences in specific sets of environmental stimuli ($S_T, S_{\gamma\prime}$) or differences in the specific overt response ($R_{\gamma\prime}$) if such responses were involved.

The Situational Component. The situational component of the Confidence response ($r_x s_x$) is established less directly (Figure 4). First the individual must make an overt response ($R_{\gamma\prime}$) which in some way alters the physical harm stimulus (S_T) situation so as to reduce the intensity of the internal stimulation produced by the physical harm threat response ($r_{ph} s_{ph}$). (This also represents one form of the conditions for acquisition of an instrumental response ($R_{\gamma\prime}$).)

The important element of the instrumental response ($R_{\gamma\prime}$) as concerns the situational Confidence component lies in the establishment of *anticipatory manipulative responses* ($r_m s_m$). These anticipatory responses represent some aspect of internal activity associated with the act of performing a given manipulative response ($R_{\gamma\prime}$). The situational component of the Confidence response ($r_x s_x$) consists of the associative connections established between the cues produced by these various anticipatory manipulative responses ($r_m s_m$) and the Confidence response ($r_x s_x$).

Thus, in order to strengthen the situational component of the Confidence response, manipulative responses ($R_{\gamma\prime}$) must be acquired in such a way as to build up strong anticipatory manipulative responses ($r_m s_m$). These anticipatory responses must have been established or practiced under conditions where they were associated with subsequent reductions in the intensity of the physical harm threat response ($r_{ph} s_{ph}$) stimulation.

Since the specific anticipatory manipulatory responses ($r_m s_m$) will differ in different situations, the strength of the situational component and thus of the Confidence response ($r_x s_x$) will vary from situation to situation. Different environmental situations will present different manipulanda stimuli ($S_{\gamma\prime}$) and will require different overt manipulative responses ($R_{\gamma\prime}$) if the physical harm stimuli (S_T) are to be neutralized and thus reduce physical harm threat response stimulation (s_{ph}).

The individual does not have equally adequate responses for every situation. In some situations, manipulative responses ($R_{\gamma\prime}$) may not exist. Therefore, there would be variations in the strength of the Confidence response ($r_x s_x$) from situation to situation. As manipulative responses ($R_{\gamma\prime}$) prove unsuccessful and

their tendency to occur decreases, the tendency of the associated anticipatory manipulative responses ($r_m s_m$) to occur also diminishes. This decline would result in decreases in the strength of the Confidence response while in the same unsuccessful situation.

Establishment of the Fractional Anticipatory Manipulative Response and the Confidence Response

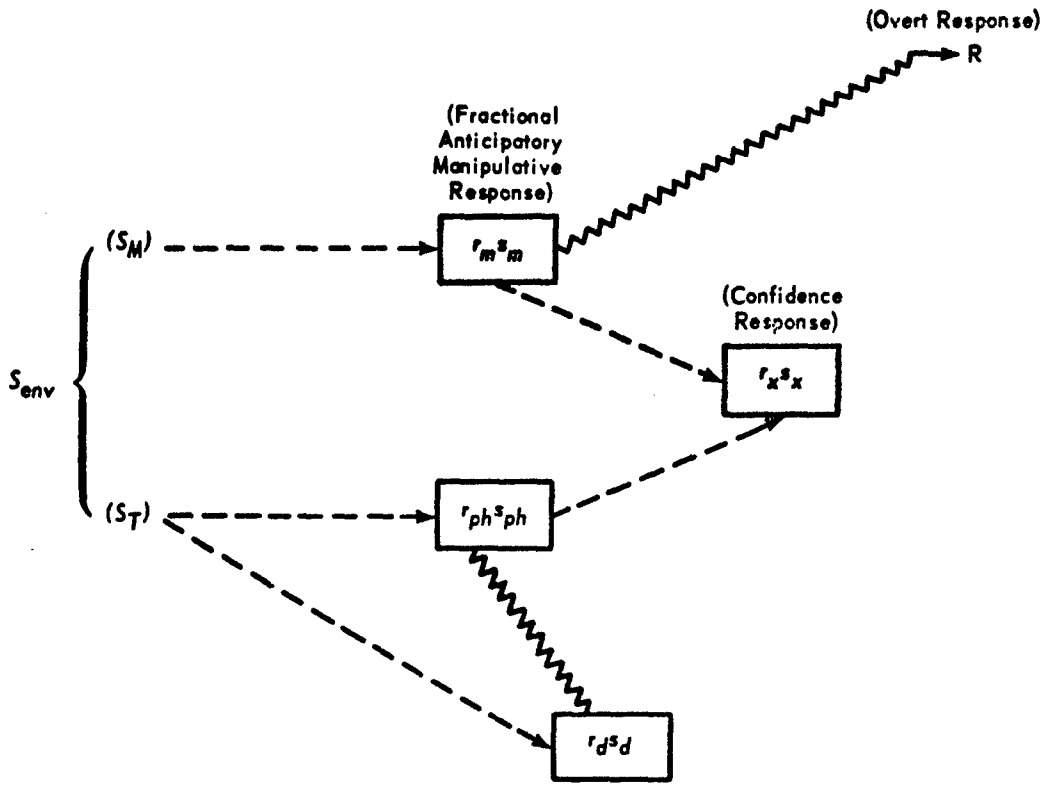

Figure 4

The assumptions involved in the establishment of the Confidence response are summarized as follows.

(1) Reduction in the intensity of the internal stimulation of the physical harm threat response results in an internal response present in all such situations. With repeated occurrences of such reductions, some part of this internal response becomes elicited as an anticipatory response by the physical harm threat response cues. This anticipatory response, described as an anticipation of reduction of intensity of the physical harm threat, is labeled the Confidence response.

(2) The strength of association between the physical harm threat response cues and the Confidence response depends upon how much threat stimulation has been reduced and how often this reduction has occurred. This connection represents the background component of the Confidence attitude.

(3) Repeated occurrences of external manipulative responses, in conjunction with a decrease in intensity of stimulation produced by the physical harm threat response establishes a tendency for the environmental manipulanda stimuli to elicit an anticipatory manipulative response.

This anticipatory response:

(a) Represents aspects of an internal response associated with the performance of the manipulative response.

(b) Differs from activity to activity and possesses cue properties of kind, thus functioning as anticipatory cues for relatively specific performance activities.

(c) Possesses cue properties of intensity. The intensity is in proportion to the strength of their association with the manipulanda stimuli.

(4) When a given anticipatory manipulative response, with its associated overt response, is followed by a reduction in the stimulation produced by the physical harm threat response, those anticipatory manipulative response cues will acquire the capacity to elicit the Confidence response. This connection represents the situational component of the Confidence attitude.

(5) The strength of the situational component of the Confidence attitude depends on the association between the anticipatory manipulative response cues present and the Confidence response.

(6) The strength of the Confidence response depends on the strengths of both the situational and the background components.

(7) The intensity of the internal stimulation produced by the Confidence response depends on the strength of that response.

Operation of Confidence and Despair Responses in the Stress Process

It was assumed that the stress process is a function of an ongoing interaction between the individual and his environment. Within the individual, two key variables—Confidence and Despair—regulate the development of the stress process, effecting the changes in the individual's stimulus orientation by virtue of the internal stimulation produced by whichever one of the two attitudes is dominant.

The changes noted in an individual's behavior—for example, from that behavior characteristic of Stage 1 of the stress process to that characteristic of Stage 2 or Stage 3—reflect shifts in the direction of the individual's stimulus search and exploratory activities. These are shifts to the stimulus orientation characteristic of each of the three stages.

The discussion below deals with the stress model process in each of the three stages of the behavioral reaction to stress. It is assumed that the individual is entering a hazardous job situation—for example, that of combat infantryman—for which he has had prior job skill training. It is also assumed that when he enters this physical harm threat situation, his Confidence response tendency is stronger than his Despair response tendency.

Stage 1

General Characteristics: Confidence response tendency greater in strength than Despair response tendency, which results in:

Stimulus Orientation: External cues associated with control or manipulation of the environment (S_{ff})

Class of Behaviors: Job performance-centered behaviors (R_{ff})

The soldier, upon entry into combat, has completed pre-combat training during which he has acquired proficiency in job skills. Most of these skills are manipulative responses (R_{ff}) that neutralize or control threats in the environment. It is assumed that the soldier enters combat with a stronger Confidence than Despair response tendency and his state in the stress process is, therefore, Stage 1.

The Confidence State and Its Accompanying External and Internal Response-Produced Stimulus Environment

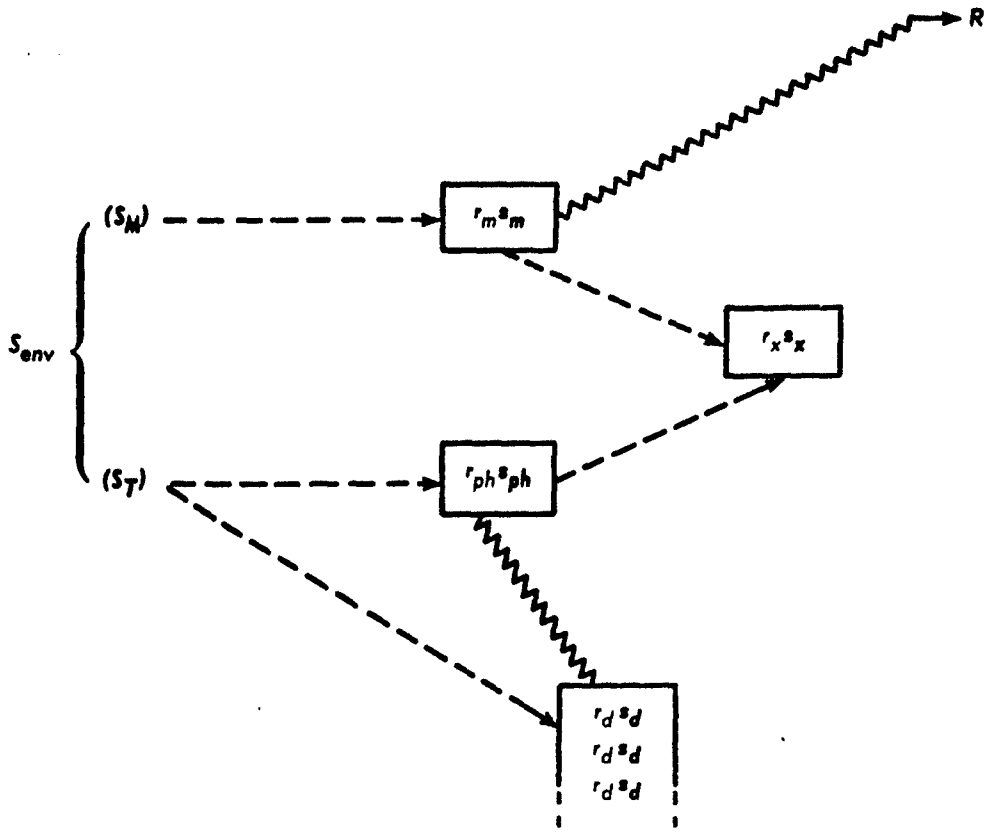

Figure 5

This soldier's external and internal stimulus environment, with the occurrence of the dominant Confidence response ($r_x s_x$), is depicted in Figure 5. His external stimulus environment consists of both manipulanda stimuli (S_M) and physical harm stimuli (S_T). The physical harm stimuli elicit the internal physical harm threat response ($r_{ph} s_{ph}$), which produces internal stimulation that may be described as a vague or generalized anticipation of danger. The intensity of this internal stimulation (the feeling) depends upon the summated strengths of associative connections between the physical harm stimuli (S_T) present and the physical harm threat response ($r_{ph} s_{ph}$).[1]

The soldier's internal stimulus environment also includes stimulation produced by the anticipatory damage responses ($r_d s_d$). Since the cue properties of these responses differ in quality, they tend to identify the nature of the bodily threat. To an observer many of these anticipatory damage responses ($r_d s_d$) are evident as symptoms of anxiety. The individual, to the extent that he is aware of them, describes them as "knot in stomach," "butterflies in stomach," "lump in throat," variously located aches or pains, and so forth.

Because of internal damage responses ($r_D s_D$) produced by combat stimuli (e.g., incoming rounds exploding nearby, intense noise, minor wounds), many of the anticipatory damage responses ($r_d s_d$) in the soldier's repertoire are strengthened during his combat exposure and some new ones might even be added. This occurs even though the Confidence response is dominant.

[1]In this model affect is considered a by-product of the stress process. Affect can be described in terms of intensity and direction. Intensity of affect would be described as a direct function of the summated intensity of all ongoing internal stimulation, direction by whether Confidence or Despair is dominant.

Stimulation produced by the internal damage responses ($r_D s_D$), depending upon environmental conditions (S_T), appears in any stage of the stress process, including Stage 1. How much they strengthen the Despair response tendency or the anticipatory damage responses ($r_d s_d$) depends upon the intensity of the internal stimulation (s_D) their occurrence produces.

Internal damage responses also temporarily intensify the stimulation characteristic of the two types of anticipatory responses. This is most important for the Despair response. Since the Despair response represents response elements common to all internal damage responses ($r_D s_D$), the occurrence of an internal damage response produces an intensity of stimulation usually identified with the anticipatory Despair response. If sufficiently intense, it could temporarily alter the soldier's stimulus orientation to that of the anticipatory Despair response.

As the intensity of this internal damage response stimulation subsides, the soldier's stimulus orientation reverts back to the job-performance orientation produced by the again-occurring Confidence response. The exception to the Confidence response tendency reassuming its dominance again occurs when it and the Despair response tendency had been so close in strengths that increases in the strength of the Despair response and/or decreases in that of the Confidence response bring about a reversal in the dominance of Confidence over Despair.

The soldier's internal stimulus environment during Stage 1 has been described as including stimulation produced by the physical harm threat, anticipatory damage, and, sporadically, internal damage and Despair responses.

Another internal stimulus also present and responsible for the characteristic features of Stage 1 is the stimulation produced by the Confidence response. The intensity and cue value of Confidence stimulation facilitate the occurrence of an overt manipulative response by providing internal anticipatory stimulation (associated with such responses). Thus, the individual is oriented toward manipulanda cues in his environment.

The strength of the Confidence response ($r_x s_x$) tendency depends on associative connections with two different sources of internal cues—the background component in association with the stimuli produced by the physical harm threat response ($r_{ph} s_{ph}$) and the situational component in association with the anticipatory manipulative responses ($r_m s_m$). It is, thus, *possible for a low-strength background component to be compensated for, to some degree, by a high-strength situational component, and vice versa.*

The effectiveness of the Confidence response ($r_x s_x$) as an orienting stimulus will be maximum when

(1) The individual has a past history of having frequently been exposed to situations in which his overt manipulative responses (R_M) or some other circumstances led to sizable reductions in the physical harm threat response ($r_{ph} s_{ph}$) stimulation, and

(2) The individual is in a physical harm situation which elicits those (or highly similar) anticipatory manipulative responses ($r_m s_m$), and

(3) The individual's Confidence response tendency is stronger than his Despair response tendency.

It will be noted that, at any given time, the intensity of the stimulation produced by the Confidence response ($r_x s_x$) is independent of the intensity of the stimulation produced by the physical harm threat response ($r_{ph} s_{ph}$).

The soldier's prior training is assumed to have provided him with anticipatory manipulative responses ($r_m s_m$) having relatively strong associations with the Confidence response ($r_x s_x$). This association (the situational component) will be weakened if, when overt responses (R_M) are carried out, they fail to produce the expected effect, that is, to reduce the intensity of the physical harm threat response stimulation (negative feedback). If overt instrumental responses are ineffective, the tendency for the physical harm threat response cues to elicit the anticipatory Confidence response (the background component) would weaken unless the action of forces or circumstances independent of the individual produce a reduction in the environmental stimuli (S_T).

Any factor that lessens the number of anticipatory manipulative responses ($r_m s_m$) elicited, or inhibits those having the stronger associations with the Confidence response, will reduce the strength of the

Confidence response tendency and, hence, its effectiveness in orienting toward job-performance stimuli. (An example would be environmental conditions which impair sensory functioning directly relevant to the detection of manipulative cues (S_M).)

Stage 2

General Characteristics: Despair response tendency greater in strength than Confidence response tendency, which results in:

Stimulus Orientation: External danger stimuli and internal anticipatory damage stimuli.

Class of Behaviors: Danger-oriented behaviors.

The internal damage response ($r_D s_D$), elicited by damage to the soldier from environmental physical harm stimuli (S_T) performs a stimulus-orienting function. In general, the effectiveness and exact nature of this orienting function depends on the intensity of the stimulation produced by the internal damage response.

The Despair response derives its stimulus-orienting function from the internal damage response ($r_D s_D$) and, in the absence of an internal damage response ($r_D s_D$), the anticipatory Despair response performs the stimulus-orienting function.

As the strength of the Confidence response tendency decreases during Stage 1 of the stress process, the Despair response intrudes more often and for longer periods. In the combat situation, this trend would generally be a function not only of the decreases in strength of the Confidence response tendency, but also of increases in the strength of the Despair response tendency. These could occur through increases in the strength of the background component, the situational component, or both.

In a combat situation where the individual is under enemy fire, some strengthening of the Despair response tendency would generally be expected. Physical harm stimuli (S_T) which directly assault the individual (e.g., nearby explosions) elicit internal damage responses ($r_D s_D$) which, in turn, strengthen the

The Despair State and Its Accompanying External and Internal Response-Produced Stimulus Environment

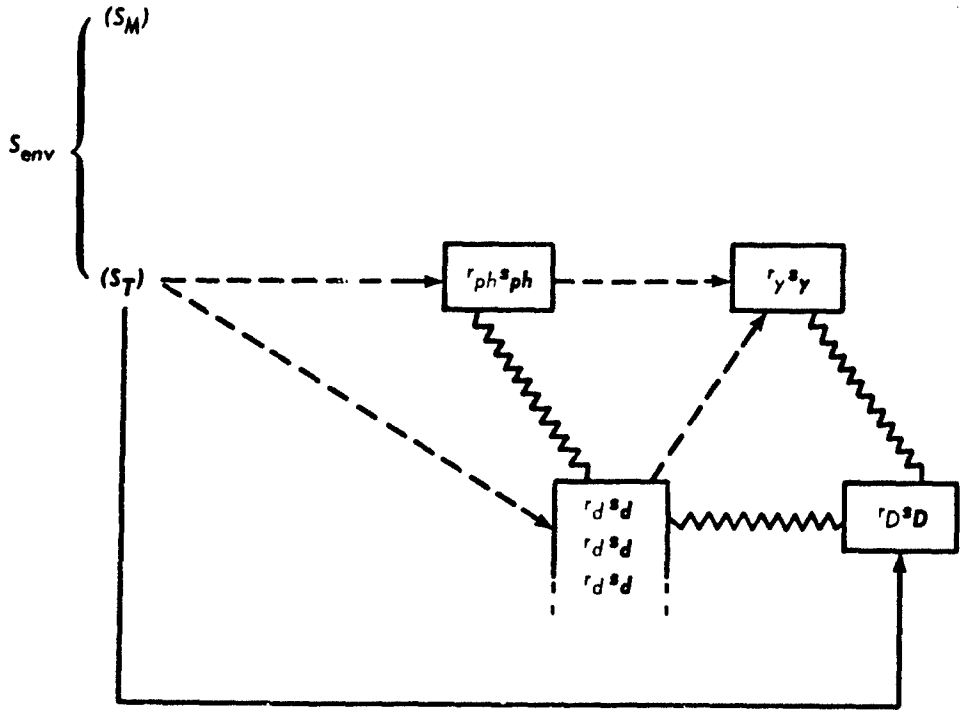

Figure 6

associative connection between the physical harm threat response stimulus (s_{ph}) and the Despair response (the background component). These instances also strengthen the association between anticipatory damage responses ($r_d s_d$) and the Despair response (the situational component).

Since the strength of the situational component depends on the combined associative strengths (with the Despair response) of all the anticipatory damage responses ($r_d s_d$) occurring at any given time, the occurrences of a greater number of anticipatory damage responses augments the strength of the Despair response tendency for that period of time, even in the absence of internal damage responses (Figure 6). Anticipatory damage responses ($r_d s_d$) are added, for example, as the result of seeing other persons wounded or killed. Verbal processes play a major role in facilitating or inhibiting the mobilization of the anticipatory damage responses ($r_d s_d$).[1]

As the intensity of the stimulation produced by the Despair response increases, its potency in orienting the individual to anticipated dangers increases. The individual's stimulus orientation gradually shifts, then, from the environmental danger stimuli to the internal anticipatory stimuli represented by the anticipatory damage response stimuli and the anticipatory Despair stimulus.

Stage 3

General Characteristics: Despair response-produced stimulation is intense and the Despair response tendency is greater than the Confidence response tendency.

Stimulus Orientation: Internal anticipatory damage stimuli.

Class of Behaviors: Decline of both performance-centered and danger-oriented behaviors.

It is assumed that certain conditions of anticipatory damage response ($r_d s_d$) pattern and Despair response intensity result in stimulation that is, in effect, a facsimile or pseudo-internal damage response ($r_D s_D$). In other words, the qualitative and quantitative characteristics of the internal stimulation are subjectively indistinguishable from the corresponding characteristics of the internal stimulation produced by an actual internal damage response.

It is assumed that the cue distinctiveness of different internal damage responses ($r_D s_D$) is greatest at middle ranges of intensity and diminishes as the intensity increases (or decreases). Therefore, at middle ranges of intensity of the anticipatory damage response ($r_d s_d$) and Despair response stimulation, experiencing pseudo-internal damage responses is less likely and depends on the particular pattern of anticipatory *damage response* ($r_d s_d$) stimulation present.

When high intensity anticipatory damage responses are present, there is little, if any, discrimination in terms of the internal damage responses to which they refer. Further, these intense responses, especially when added to by intense Despair responses, are experienced as if they were massive, intense, and diffuse internal damage responses. This internal stimulation is sufficiently intense to keep the individual oriented solely to internal stimulation, and unresponsive to external stimuli.

Summary of Stages

When the strength of the Confidence response tendency is greater than the strength of the Despair response tendency, the stimulus orientation of the

[1] In general, the verbal processes are viewed as a supplementary system of conditioned responses with cue properties which become attached to the various external stimuli and internal response-produced stimuli described in the model. From this viewpoint their major function is that of enhancing discrimination and, an opposing function, that of providing "bridges" for mediating generalization between otherwise dissimilar environmental and non-verbal response-produced cues. Consideration is being given to the possibility of utilizing Osgood's (39) conceptual and empirical approach in integrating the human's supplementary verbal cue system with the present model of the operation of non-verbal factors in the stress process.

individual in a hazardous job situation is directed toward external cues associated with controlling or manipulating the environment (Stage 1).

Under conditions in which physical harm stimuli continue to exist in the environment in spite of the individual's manipulative efforts to remove them, there is a transition period during which these relative strengths shift to give a decided dominance to the Despair response. There is a gradual increase in the frequency and duration of intrusions of the Despair response until it becomes decidedly stronger than the Confidence response tendency. This transition period, which begins in the latter part of Stage 1, is one in which the stimulus orientation is toward danger stimuli (Stage 2).

As the Despair response becomes much stronger than the Confidence response, the shift of stimulus orientation to the various types of internal anticipatory damage cues is complete and the individual no longer "has" an external stimulus environment. This condition is described as an orientation toward those internal stimuli produced by the anticipatory damage responses and the Despair response. When responses produce intense internal stimulation, this stimulation is subjectively indistinguishable from actual internal damage responses (Stage 3).

Chapter 4

THE DESIGN OF STRESS-RETARDANT TRAINING

The function of a conceptual model is to serve as a guide to ways of approaching problems. The conceptual model of the stress process has been used both for analysis of implications for research on stress-retardant training and for analysis of training itself, to explore aspects related to retarding the stress process. Implications of the model for research are discussed in Appendix A. This chapter discusses elements of training that bear on stress development, and the implications of the model for retarding stress.

IMPLICATIONS OF THE MODEL FOR TRAINING

Methods for increasing effectiveness of combat performance could be of two general types: Those applied prior to exposure to the severe stressor environment (combat), and those applied during exposure to the severe stressor environment. This discussion will be concerned primarily with the precombat of training application. Thus, in discussing implications of the conceptual framework for efforts to increase stress resistance, we move backward in time from the setting of the stressor situation to that of the pre-exposure training situation.

One general implication of the model is obvious: Training for stress resistance must be designed so as to produce differential effects in the strengths of the Confidence and Despair response tendencies that will be effective when the individual is under the actual stress conditions for which he is being prepared. The differential effects sought are (a) maximal strengthening of the Confidence response tendency to relevant cues that will be encountered in the stress situation, and (b) at the same time restricting, to a minimum, increases in the strength of the Despair response tendency to cues that will be encountered in the stressor situation.

The Confidence and the Despair Attitudes

The background component of the Confidence and of the Despair attitudes in a young adult derives from the sum of all his past experiences in situations involving physical harm stimuli. Many of these experiences, especially in the preschool years, were associated with the normal developmental pattern of learning to walk, run, climb, and so forth. As the boy grows older, a broader range of activities becomes possible, and these activities contain varying degrees of physical harm potentiality. In most such activities (e.g., sports such as horseback riding, boxing, and swimming) the likelihood of injury is to an important extent dependent upon how the individual handles himself. Thus, part of the task posed by these school-age activities is learning how to control or neutralize physical harm threat while continuing the activity. For example, the baseball player learns how to slide into a base; the football player learns how to block, tackle, and fall so as to minimize risk of injury as well as how to play the game more effectively.

The school-age boy exercises some option in the exact activities he engages in and how often he continues to engage in them as time goes on. The more frequently he has engaged in (physical harm) activities, the greater the potential of physical harm these activities pose, and the more often his engagement has been characterized by success in controlling the physical harm threat, the greater will be the accumulated strength of the background component of his Confidence attitude. The more often his past involvement has been accompanied by physical harm, the greater will the accumulated strength of the background component of his Despair attitude. The individual who has, for whatever reason, engaged in relatively few physical harm activities accumulates relatively low-strength background Confidence and background Despair components.[1]

In adults of Army age, the strengths of these two background components represent the summation of 18 or more years of experience. Because of the magnitude of the strengths already present, it is doubtful whether the effects of relatively short periods of training could add significantly to the background confidence component in the case of most young men. The greatest effects during the relatively short periods of training are expected on the situational components of the Confidence and Despair attitudes.[2] This is especially true to the extent that the hazardous job for which the man is being trained represents situations and performances not in his past experience.

The discussion which follows will focus on implications of the model for differential strengthening of the situational components of the Confidence and Despair attitudes.

Context of Stress-Retardant Training

Job skills, and attitudes of Confidence and Despair (the situational components), are acquired simultaneously during the course of any training for a hazardous job, though not necessarily in the desired combinations.

For most hazardous jobs, even before the man starts training he knows that if he ever performs on the job (e.g., goes into combat), hazard will exist. It is not necessary to tell the trainee that the job of the combat infantryman involves a certain amount of danger. Men start their combat or hazardous job training with such an expectation present in varying degrees.

While the trainee is learning about the conditions that serve as cues for certain performances and is practicing the training versions of these performances, he is also learning something else—that many of these conditions are also cues of danger to life and limb.

Job skill training teaches the combat soldier to recognize certain stimulus conditions as cues and to respond to them with specific performances. At the same time, this training also develops his proficiency in carrying out these performances. For example, he learns how to identify critical cues and to perform accordingly in moving and taking advantage of terrain while advancing under various conditions of enemy fire.

It is doubtful whether any type of training for hazardous jobs can be carried out without producing some increase in situational despair. Even if it were possible, to the extent that cues for different types of danger are also cues for different types of job performance it would not be desirable.

[1]To assess the strengths of the background Confidence and background Despair components, an Activities Inventory was developed and tested. This exploratory work is described briefly in Appendix B, and a sample from the Inventory is shown in Appendix C.

[2]An assessment device was constructed as a self-rating form to reflect relative strengths of the situational components of the Confidence and Despair attitudes. Development and test of this Situational Confidence-Despair Rating is described in Appendix B, and the form is shown in Appendix D.

Knowledge of the cues indicating the possible presence of mines or booby traps, for example, is knowledge the soldier must have to carry out his job.

Designing training for hazardous duties, then, involves not only the problem of designing good skill training but also the problem of designing it to produce the desired differential effects on situational confidence and situational despair.

The proposition that both skills and Confidence/Despair attitudes are acquired simultaneously during skill training is in contrast to a common practice of conducting skill training to build up a man's technical proficiency and separate attitude training to build up his "confidence." It also calls into question the proposition that men who develop high technical proficiency during training automatically develop a great amount of stress resistance for subsequent combat.

State of the Individual During Training

Stimulus Orientation During Training

It has been assumed that these two mutually exclusive responses, Confidence and Despair, control the individual's stimulus orientation. In order to learn to discriminate the cues (S_M) important to job performance, the individual must have the appropriate stimulus orientation—that is, his Confidence attitude must be dominant.

If an individual's Despair (attitude) response tendency were stronger than his Confidence (attitude) response tendency, his stimulus orientation would be toward danger stimuli. This means his stimulus environment would consist essentially of environmental physical harm cues (S_T) and internal anticipatory damage responses ($r_d s_d$). Consequently, he would learn about all the things that can go wrong, but not how to identify manipulative cues (S_M) and carry out the associated performances that would tend to control the situation and prevent harm.

Thus, upon entry into training for combat: (a) If the individual's Confidence attitude is stronger than his Despair attitude, either attitude (or both) can be strengthened by the training; (b) to the extent that the individual's Despair attitude is stronger than his Confidence attitude, only the Despair attitude can be strengthened in training.

If an individual enters combat training with a dominant Despair attitude, this does not necessarily mean that this situation will persist throughout training. Initial dominance of the Despair attitude could be the result of two different sets of conditions, and the effects of training would not be the same for both.

The individual with a dominant Despair attitude based on the background despair component is likely to display anxiety, resentment, hostility, and depression; development of stress resistances during job training would be unlikely under usual training conditions. The individual whose dominant Despair attitude is based on the situational despair component is more likely to succeed in increasing stress resistance, since the situational component fluctuates with changes in the anticipatory damage responses elicited by the ongoing environmental conditions. The likelihood of arranging training conditions so as to minimize the anticipatory damage responses, and thus permit the Confidence attitude to become dominant and further strengthened, is reasonably high.

Physical Harm Threat Arousal During Training

The physical harm threat response must be elicited during the time of skill acquisition. Since the trainee enters most types of hazardous job training

with anticipatory sets that include the presence of the physical harm threat response, it is the intensity of the physical harm threat response elicited, rather than its presence or absence, that is critical.

According to the model, intensity of this internal threat response is important in determining the size of the increase in the Confidence and Despair attitudes during training. Thus, the presence of a very intense physical harm threat response would result in a relatively large increase in the strength of the Confidence attitude if the individual carries out the performance and receives appropriate feedback cues indicating it was effective in neutralizing or controlling the threat. By the same token, if there is evidence that the performance was ineffective, or if the individual is bombarded by a host of physically traumatic stimuli during this time, the increase in the strength of the Despair attitude would also be large in the presence of very intense physical harm threat responses.

Since both Confidence and Despair attitudes are strengthened as intensity of the physical harm threat response increases, designing training to elicit strong physical harm threat responses—as is frequently recommended—would not tend to increase stress resistance. For example, a long-standing proposal for designing training to improve performance under stress has been the idea of "adapting" the individual to stress by creating stress during the training. According to the present model, if the stressors (S_T) introduced are unnecessary to the future discrimination of performance cues (S_M), they would produce an unnecessary rise in situational despair, and thus would have effects opposite to those intended by "adaptation to stress." If these stressor cues are necessary to the future discrimination of performance cues, they generally require simulation and the question is that of determining the most effective form of simulation. This question will be considered in the section dealing with factors in the design of training.

This discussion can be summarized in terms of two propositions: (a) When an intense physical harm threat response is elicited during training, large increases can occur in both Confidence and Despair. (b) When relatively weak physical harm threat responses are elicited during training, a greater amount of practice is required in order for large increases in Confidence to accrue; however, since anticipatory damage responses would be low in number and intensity, increases in Despair would be proportionately less than increases in Confidence.

DESIGN OF JOB TRAINING TO INCREASE STRESS RESISTANCE

Acquisition of the job skills is a necessary but insufficient condition for increasing an individual's stress resistance upon subsequent entry into the hazardous job situation. Skill training provides the manipulative responses (R_M) described in the model as the necessary first step in the development of situational confidence. However, it is important to keep in mind that simply strengthening situational confidence is not synonymous with increasing stress resistance. Though the absolute strength of situational confidence is a factor, it is the differential in strength between this attitudinal component and situational despair that sets the problem for the design of training.

Well-designed skill training having high proficiency objectives would generally be expected to meet the specific conditions to be described for strengthening situational confidence. However, the question of what constitutes "well-designed" skill training is itself a complex matter. Combat training that

fails to develop the appropriate cue (S_M) discriminations and performance proficiencies (R_M) will, according to the present model, also fail to develop situational confidence relevant to the combat situation, however well the training is otherwise designed. Thus, conditions essential to strengthening of situational confidence necessarily include those required to develop job skills.

A Method of Schematizing the General Requirements for Job Training

For our purposes, a combat skill may be regarded as the ability to recognize certain cues in a situation that call for certain responses consistent with the individual's mission in the situation, and the ability to carry out these responses. Skill proficiency is defined by imposing performance standards on this process of assessing the situation and taking action.

Training designed and carried out to develop certain skills may succeed, as measured by end-of-training proficiency tests, in developing a high level of proficiency in these skills. Nevertheless, it may still fail in developing the cue discriminations and performances necessary in the job situation. In such a case, it also would not contribute to the development of the individual's situational confidence relevant to stress resistance on the job.

In discussing the training conditions, then, we need some way of characterizing training design in terms of its likelihood of developing skills and attitudes appropriate to the hazardous job situation. For this purpose, design requirements for job training and the concurrent attitudinal development will be discussed using the concepts of fidelity and form of representation as applied to stimulus, response, and feedback elements. An additional training factor, amount of practice, is also included in this schema. These dimensions and the training design factors will be described briefly, and the implications of the model of the stress process for training to increase stress resistance will then be summarized.

Dimensions of Fidelity and Form of Representation

Two dimensions are used to describe stimulus, response, and feedback conditions critical to a particular performance:

(1) Fidelity is conceived of as a dimension extending from low to high. It, in general, refers to the extent to which training conditions present the stimulus, response, or feedback elements critical to the performance as it would be expected to occur under combat conditions.

(2) Form of representation is used to reflect the fact that critical stimulus, response, or feedback elements can be presented in forms other than the identical form in which they occur in combat. This dimension extends from concrete to symbolic forms. In many instances, critical elements must be represented in training in some form that "stands for" the combat event or else it is not represented at all (e.g., the use of a silhouette target in marksmanship training to symbolize an enemy soldier). The use of live ammunition in training exercises is an attempt to provide concrete representation of certain, presumably critical, combat events.

These two dimensions are, in general, independent of each other. High fidelity of critical stimulus elements occurs in training through either concrete or symbolic forms of representation. Low stimulus fidelity means that few, if any, of the cue elements critical to the performance in combat are present in the training; however, the cues represented—whether critical or noncritical—may be either concrete or symbolic in form of representation.

At the present time, these dimensions are used only in a relative fashion, with no attempt to define different degrees of either low-to-high fidelity or concrete-to-symbolic forms of representation.

Critical Stimulus Elements

Stimulus fidelity refers to the degree to which the design of the training presents the combat cues critical to initiating, modifying, or excluding responses as would be appropriate in combat. Low stimulus fidelity means that the training presents the performance without any particular reference to the combat conditions that would render it either appropriate or inappropriate. The critical cues associated with the care and cleaning of a weapon during training, for example, are usually those relevant to garrison inspections rather than to maintenance and operation of the weapon in combat. To the extent that this is true, such training would be described as having low stimulus fidelity for combat.

Training that is low in stimulus fidelity for combat would not be expected to effectively develop combat skills nor, holding other factors constant, to markedly facilitate stress resistance in subsequent combat.

The intent in most attempts to introduce combat realism in training is presumably that of increasing the stimulus fidelity for combat. Aside from the question of how well such attempts at realism may succeed, it should be noted that this very concrete method (i.e., the effort to duplicate situations as they might occur in combat) is not the only way to increase stimulus fidelity for combat. More symbolic representation of the critical combat conditions or events can also provide high stimulus fidelity for combat. Verbal descriptions, pictures, and sand tables are some of the more common attempts to symbolically represent the elements of the combat conditions that are essential or important to the particular performances being taught.

Critical Response Elements

Whether or not training is high in stimulus fidelity for combat, it may still have low response fidelity for combat. Low response fidelity means that the performance as taught or practiced in training is not the same behavior, or sequence of behaviors, that is considered essential to this performance under combat conditions.

While it is generally true that training having high stimulus fidelity may have either high or low response fidelity, in the case of training for hazardous jobs the form of representation of stimulus elements can set limitations on the response fidelity of the training. The effort in combat training to achieve high stimulus fidelity of certain critical cues through concrete form of representation is illustrated by the use of live ammunition. If the training is concerned with, say, squad tactics, this representation of the stimulus elements raises safety considerations which result not only in a degradation of fidelity in other stimulus elements, but frequently in a serious lowering of response fidelity. For example, some live fire assault exercises have been laid out with carefully marked lanes for the individual soldier and with checkpoints just prior to targets to halt all men so that preparation to fire (lock and load) can be controlled by command.

Training designed with low response fidelity for combat would be relatively ineffective in either developing combat skills or increasing subsequent stress resistance in combat since it tends to teach skills not appropriate to combat.

Critical Feedback Elements

The feedback cues considered important to training are those environmental cues the individual might use in combat to judge the adequacy or inadequacy of a particular performance in accomplishing its objective. The present model of the stress process implies that, in addition to their role in skill acquisition, the fidelity and form of representation of the feedback associated with particular (adequate and inadequate) performances are important to the development of Confidence and Despair attitudes, and hence to the individual's subsequent stress resistance in combat.

In hazardous job training there are two different aspects to the feedback cues which tend to be associated with adequate or inadequate performance:

(1) Information feedback regarding the performance itself and its effects on the environment—the performance feedback function.

(2) Information portraying the physical harm consequences or aftermath of (generally inadequate) performances—the physical harm feedback function. It sometimes occurs as an inseparable part of the cues critical to the performance feedback function (e.g., during jump training, the impact of the chute opening, and of landing). In other instances its prominence depends upon the use of specially introduced cues (e.g., the instructor's description of what will happen to the man if he drops a live grenade), completely independent of the critical performance feedback cues. Thus, cues during training that serve the physical harm feedback function vary widely in whether they also provide performance feedback.

The performance feedback function is considered of primary importance to the development of situational confidence; the physical harm feedback function is considered of primary importance to the development of situational despair. In a training situation, the cues relevant to each of these two functions would be analyzed separately in terms of fidelity and form of representation (i.e., concrete or symbolic).

For example, in training the rifleman on covering his field of fire, feedback cues for adequate performance may be provided by the use of "pop-up" targets which fall when hit. If these targets are properly placed, the cues for the performance feedback function would be classed as high fidelity, symbolically represented feedback for "correct' responses. By remaining upright when not hit, pop-up targets also provide cues for the performance feedback function for inadequate responses. These cues would be classed as high fidelity, symbolically represented performance feedback for "incorrect" responses.

Cues for the physical harm feedback function in this example are represented by the continued presence of the symbolic enemy when the target is not hit. These cues would be classed as low fidelity (e.g., the target is passive), symbolic representation.

Now suppose this example of training is redesigned to represent the cues for the physical harm feedback function concretely rather than symbolically. If it were feasible—which it is not—to have "aggressors" take the place of pop-up targets and exchange live fire with the trainee while attempting to advance on his position, the cues for the pnysical harm feedback function would be classed as high fidelity, concrete representation.

If demolition pits located relatively close to the trainees were added to the training in place of the live fire of the aggressors, the cues for the physical harm feedback function would be classed as low fidelity, concrete representation. These cues are low fidelity because, except for the noise and confusion they create, they do not have the important cues characteristic of enemy fire.

Amount of Practice

The present model of the stress process implies that even in instances where the performance itself is quite simple, it is the repetition of this performance in response to the critical performance cues, and the trainee's observation of the effects (the performance feedback function) of this performance, that strengthens the situational confidence essential to resistance to stress.

It is frequently argued that, if a combat performance can be taught by having the individual make use of certain physical acts common in everyday life, then the amount of practice required in order to perform proficiently is greatly lessened. For example, a case has been advanced for having the soldier apply generally developed pointing habits in firing his rifle rather than using his sights under certain conditions. Similarly, instructors frequently attempt to relate grenade throwing to other commonly developed throwing habits. If such an adaptation appears feasible, training tends to be reduced to a description of the conditions in which the response should be made.

Even if it is assumed that skill proficiency will not be less as a result of the lack of practice of the old response in the new context, the conditions considered necessary for strengthening situational confidence would lead us to expect only minimal increases under such circumstances. In other words, practice of the response in the new performance cue situation with appropriate feedback conditions is regarded as essential to build situational confidence even if acceptable levels of skill-proficiency could be demonstrated following training which omitted the physical practice.

Training Conditions Necessary for the Strengthening of Situational Confidence

The necessary conditions, during training, for strengthening situational confidence relevant to stress resistance in the hazardous job situation are:

(1) A relatively high degree of stimulus fidelity for the cues critical to initiating, modifying, or excluding execution of the given job performance. Use of a symbolic form of representation of critical performance cues is indicated when these cues also represent physical harm stimuli whose presence in the training situation requires special safety procedures (which, in turn, degrade response fidelity and other critical performance cues).

(2) A relatively high degree of response fidelity in execution of the performance acts which make up the hazardous job. It is assumed that the form of representation of the response during training must be concrete (i.e., the trainee must physically carry out the performance, in contrast to rehearsing verbally or viewing a demonstration).

(3) A relatively high degree of fidelity of performance feedback for adequate responses in the hazardous job situation. The form of representation of these critical performance feedback cues would be subject to the same considerations described under the critical stimulus conditions in (1).

(4) Repeated execution of the job performance responses (2), in response to the critical performance cues (1), under performance feedback conditions (3), for "correct" or adequate responses.

The above conditions for the strengthening of situational confidences are essentially those generally accepted as the goals for the design of good skill training. If an amount of practice is specified that would correspond to

overlearning conditions, we then have, in toto, a proposal which has commonly been made in the past for increasing effectiveness of performance under combat stress—the overlearning of performance skills. However, in the present case the above conditions are considered to be necessary but insufficient conditions for increasing resistance to stress.

The stress model indicates that training must maximize situational confidence while, at the same time, holding to a minimum increases in situational despair. Thus, in order to complete the implications of the model for the design of stress-retardant training, it is necessary to consider the conditions affecting situational despair.

Training Conditions Affecting Situational Despair

In the conditions described for the strengthening of situational confidence, the model implies that the strength of situational despair will be effected as follows:

(5) To the extent that the critical performance cues (1 above), the job performances (2 above), or the performance feedback cues for adequate responses (3 above) also possess physical harm cue functions, they will tend to increase the strength of situational despair. The higher the fidelity (for physical harm consequences) and the more concrete the form of representation of this physical harm cue function, the greater will be its tendency to strengthen situational despair.

(6) To the extent that feedback cues for incorrect responses possess physical harm cue functions, these feedback cues will tend to strengthen situational despair. The higher the fidelity (for the physical harm consequences) and the more concrete the form of representation of the physical harm feedback cues, the greater will be their tendency to strengthen situational despair.

(7) The tendency for situational despair to be strengthened will be further increased by the presence of physical harm cues which are not relevant to the job situation or job performance for which the training is being conducted, but which instead reflect conditions peculiar to the training situation associated with acquisition of a given performance (e.g., safety restrictions imposed to protect the individual from the effects of his own performance in training which would not be imposed to protect him in carrying out the same performance in combat). The higher the fidelity of these (job-irrelevant) physical harm consequences and the more concrete their form of representation, the greater will be their tendency to strengthen situational despair.

DISCUSSION OF TRAINING IMPLICATIONS

The model of the stress process has enabled us to describe, independently of specific training or job contexts, conditions during training which will affect the extent of development of situational confidence and situational despair. At the present time, these conditions represent assumptions or hypotheses to be tested in subsequent research.

To the extent that these hypotheses are valid, they would represent guidelines to be used during the analyses of hazardous jobs and their accompanying performance requirements, and during the translation of the results of these

analyses into the preparatory training program. Thus, they would supplement procedures currently used in designing combat skills training (40).

Training practices which would be affected by application of these guidelines can be illustrated by a few examples of current training practices.

Proficiency Objectives and the Development of Situational Confidence

Combat training can be classified—on the basis of either its formal objectives or the way it is carried out—into essentially three types:

(1) Skill training is characterized by the development of a certain level of proficiency in carrying out performances in response to different conditions having some correspondence to those considered vital to the individual's job position in future combat.

(2) Knowledge training involves developing a certain level of achievement in learning subject matter. It does not include the development of proficiency in executing activities.

(3) Indoctrination training represents the traditional film or lecture approach in dealing with motivational or attitudinal objectives rather than with achievement of specific performance skills or acquisition of facts.

Since the time spent in basic training programs is limited, breadth of coverage contends against depth of coverage as an issue in the design of training. As a result, different proficiency levels and standards of achievement are set in the various skill or knowledge content areas. Such levels are frequently indicated by use of terms such as orientation, familiarization, or mastery. (Familiarization is generally interpreted to set a higher standard of achievement than orientation.)

In practice, the lower the proficiency objective set for skill training, the less there is an observable distinction between it and knowledge training. Thus, in training, combat skill performances which, for one reason or another, are given relatively low end-of-training proficiency standards become primarily or entirely "bleacher training." This means that the trainee receives little or no practice in executing such performances in response to conditions similar to those which would cue these performances in combat. In contrast, implications from the model of the stress process suggest that even though the performance by itself may be quite simple, it is the trainee's "doing" of this performance in response to some representation of the critical performance cues of combat, and his observation of the effects of his response, that build up the situational confidence essential to stress resistance.

Combat training which fails to develop the appropriate cue (S_M) discriminations and performance proficiencies will, according to the present model, also fail to develop situational confidence relevant to the combat situation, however well the training is otherwise designed. Thus, the question of training producing "false" confidence resolves to the question of training producing "false" cue (S_M) discriminations and performance skills.

Comparative Development of Situational Confidence and Situational Despair

In training for hazardous jobs, the individual acquires not only performance skills and knowledge but also detailed impressions of the nature and extent of potential dangers, and the possible damage which these dangers can inflict upon him. In other words, Despair is also being built up. It is the saving grace of well-designed training, programed for high proficiency standards, that as the trainee acquires proficiency and learns more about the potential dangers, he

is also able to demonstrate to himself that he can deal effectively with most of these potential dangers, should they develop in combat.

In some instances training seems less oriented to teaching performance cues relevant to combat, and developing proficiency in executing these performances, than it is to providing knowledge of the potential consequences of the dangers inherent in combat, climatic conditions, and combat equipment. According to hypotheses deduced from the model, much training of the orientation type may actually tend to lower subsequent resistance to stress because situational confidence has not been strengthened while situational despair has been increased by enhancing the trainee's appreciation of the potential dangers and their harmful consequences.

Occasional practices in combat or general training illustrate training design which, in terms of the present model, would be characterized as promoting low situational confidence and high situational despair. An example is provided by training with regard to health problems not directly related to enemy action, but due to the climatic conditions to which the soldier is exposed. A soldier may become a casualty requiring evacuation from combat because he fails to exercise preventive measures within his capability. Prevention of trench foot and frostbite pose this kind of training problem, as did the use of atropine in the South Pacific in World War II to prevent malaria. The conventional training approach has been to introduce the combat trainee to these problems via training films. Thus, a film on frostbite may vividly illustrate the painful and permanently crippling consequences of frostbite by presenting detailed photographic evidence of the progressive tissue deterioration and loss of toes suffered by a particular soldier. According to the present model, such a design for a training film fulfills the conditions that ensure maximal strengthening of the soldier's situational despair attitudes relevant to prolonged exposure to cold.

Furthermore, while a film of this type may leave little to the viewer's imagination regarding consequences, it does leave to his imagination how he might integrate the preventive rules into the normally expected conditions of actual combat. The training represented by such a film does little to build up situational confidence.

Similarly, many safety training films appear to be designed in a way that would not lead to increases in situational confidence but would lead to increases in situational despair. If this is so, they defeat their own purpose by lowering the individual's stress resistance when he is engaged in the activity. An "accident-prevention" film that depicts smashed cars and mangled bodies offers nothing to promote the development of situational confidence. By concentrating on the aftermath rather than on performance errors and related feedback cues which precede accidents, the development of strong situational despair related to driving and handling of traffic emergencies is encouraged.

Safety precautions are a necessary part of most training dealing with hazardous jobs, but the prominence of safety devices and precautions can in itself serve to emphasize the dangers and thus heighten development of the situational despair. This enhancement of situational despair regarding a particular weapon or activity is especially unfortunate when the safety precautions or devices are peculiar only to the training phase. In at least some instances, the safety restrictions are imposed because the training is designed in such a way that the trainee must practice the final performance before he has developed the necessary practical skills and situational confidence. Such safety restrictions are a safeguard against unreliability of the trainee instead of unreliability intrinsic to the equipment.

For example, trainees on the firing range may be directed to turn their weapon over to a cadreman in the event of a stoppage. Or, in grenade instruction the trainee may be conducted into a specially designed concrete pit and, when throwing, stands facing a safety NCO whose job it is to recover and dispose of live grenades if the trainee freezes, fails to clear the wall with his grenade, or throws it into an adjoining pit rather than to the front. The net result to be expected from this type of training would be trainee failure to learn how to use these weapons in combat, a tendency to avoid using them in combat, and lowered stress resistance in at least the initial situations in which he was ordered to use them.

Net Effects: Immunity vs. Increased Stress Resistance

The effects of combat stress on the soldier may be viewed as a gradual wearing down of the Confidence attitudes with an accompanying increase in the Despair attitudes. Soldiers who are exposed to prolonged heavy combat characterized by a stalemate or near stalemate will exhibit the effects of this wearing-down process sooner than will troops who are relatively more successful. Improvements in training with the goal of increasing stress resistance cannot be expected to render the individual immune to the effects of combat stress. They might, however, be expected to render him less vulnerable to stress during his initial exposure and to increase his effectiveness over a longer period of time.

LITERATURE CITED

AND

APPENDICES

LITERATURE CITED

1. Haggard, E.A. "Psychological Causes and Results of Stress," Chapter 21 in *Human Factors in Underseas Warfare*, Committee on Underseas Warfare, National Research Council, Washington, 1949.
2. Harris, William, Mackie, Robert R., and Wilson, Clark L. *Performance Under Stress: A Review and Critique of Recent Studies*, Technical Report VI, Human Factors Research, Inc., Los Angeles, July 1956.
3. Klier, Sol, and Linskey, Joseph W. *Selected Abstracts From the Literature on Stress*, Technical Report 565-1, U.S. Naval Training Device Center, Port Washington, N.Y., November 1960 (Contractor: New York University).
4. Williams, Richard Hayes (ed.). *Human Factors in Military Operations: Some Applications of the Social Sciences to Operations Research*, Technical Memorandum T-259, Operations Research Office, Johns Hopkins University, January 1954.
5. Egbert, Robert L., Meeland, Tor, Cline, Victor B., Forgy, Edward W., Spickler, Martin W., and Brown, Charles. *FIGHTER 1: An Analysis of Combat Fighters and Non-Fighters*, HumRRO Technical Report 44, December 1957.
6. Egbert, Robert L., Meeland, Tor, Cline, Victor B., Forgy, Edward W., Spickler, Martin W., and Brown, Charles. *FIGHTER 1: A Study of Effective and Ineffective Combat Performers*, HumRRO Special Report 13, March 1958.
7. Berkun, Mitchell M., Bialek, Hilton M., Kern, Richard P., and Yagi, Kan. *Experimental Studies of Psychological Stress in Man*, HumRRO Research Report 10; also published as *Psychol. Monogr.*, vol. 76, no. 15 (Whole No. 534) [October] 1962.
8. Meeland, Tor, Egbert, Robert L., and Miller, Irwin. *Field Stress: A Preliminary Study of Its Structure, Measurement, and Relationship to Combat*, Staff Memorandum, HumRRO Division No. 3 (Recruit Training), May 1957.
9. Meeland, Tor, and Showel, Morris. *Observations of Seven Armed Forces Specialized Training Schools*, Staff Memorandum, HumRRO Division No. 3 (Recruit Training), February 1957.
10. Marshall, Lt. Col. S.L.A. *Island Victory, The Battle of Kwajalein Atoll*, The Infantry Journal, Washington, January 1945.
11. Marshall, Col. S.L.A. *Men Against Fire*, Combat Forces Press and William Morrow & Company, Washington and New York, November 1951.
12. Marshall, S.L.A. *Commentary on Infantry Operations and Weapon Usage in Korea, Winter of 1950-51*, ORO-R-13, Operations Research Office, Johns Hopkins University, October 1952.
13. Marshall, S.L.A. *The River and the Gauntlet*, William Morrow & Company, New York, 1953.
14. Weislogel, Robert L., Flanagan, John C., and Billingsley, Suzanne G. *The Job of the Combat Infantryman*, Technical Memorandum T-250, Operations Research Office, Johns Hopkins University, April 1954.
15. Swank, Roy L., and Marchand, Walter E. "Combat Neuroses: Development of Combat Exhaustion," *Arch. Neurol. Psychiat.*, vol. 55, 1946, pp. 236-247.

16. Beebe, Gilbert W., and Appel, John W. *Variation in Psychological Tolerance to Ground Combat in World War II*, National Academy of Sciences–National Research Council, Division of Medical Sciences, Washington, April 1958, DDC AD-210 106.

17. Swank, R.L. "Combat Exhaustion: A Descriptive and Statistical Analysis of Causes, Symptoms and Signs," *J. Nerv. Ment. Dis.*, vol. 109, 1949, pp. 475-508.

18. Greenson, R. "The Psychology of Apathy," *Psychoanal. Quart.*, vol. 18, 1949, pp. 290-303.

10. Lidz, T. "Psychiatric Casualties From Guadalcanal: A Study of Reactions to Extreme Stress," *Psychiat.*, vol. 9, 1946, pp. 193-213.

20. Lidz, T. "Chronic Situations Evoking Psychological Stress and Common Signs of the Resulting Strain," in *Symposium on Stress*, Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, 1953.

21. Bartemeier, L.H., Kubie, L.S., Menninger, K.A., Romano, J., and Whitehorn, J.C. "Combat Exhaustion," *J. Nerv. Ment. Dis.*, vol. 104, 1946, pp. 358-524.

22. Glass, A.J. *Combat Exhaustion*, M 403-2, Department of Neuropsychiatry, U.S. Army Medical Field Service School, February 1953.

23. Glass, A.J. "The Problem of Stress in the Combat Zone," in *Symposium on Stress*, Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, 1953.

24. Grinker, Lt. Col. Roy R., Spiegel, Capt. John P. *War Neuroses in North Africa, the Tunisian Campaign (January-May 1943)*, Josiah Macy, Jr. Foundation, New York, September 1943.

25. Maskin, M. "Psychodynamic Aspects of the War Neuroses: A Survey of the Literature," *Psychiat.*, vol. 4, 1941, pp. 97-115.

26. Wolfenstein, Martha. *Disaster - A Psychological Essay*, The Free Press, Glencoe, Ill., 1957.

27. Bellak, L. "Psychiatric Aspects of Tuberculosis," *Soc. Casewk.*, vol. 31, 1950, pp. 183-189.

28. Shands, H., Finesinger, J., Cobb, S., and Abrams, R. "Psychological Mechanism in Patients With Cancer," *Cancer*, vol. 4, 1951, pp. 1159-1170.

29. Strassman, H.D., Thaler, Margaret B., and Schein, E.H. "A Prisoner of War Syndrome: Apathy as a Reaction to Severe Stress," *Amer. J. Psychiat.*, vol. 112, 1956, pp. 990-1003.

30. Kral. V. "Psychiatric Observations Under Severe Chronic Stress," *Amer. J. Psychiat.*, vol. 108, 1952, pp. 185-192.

31. Hinkle, Lawrence E., Jr., and Wolff, Harold G. "Communist Interrogation and Indoctrination of 'Enemies of the States'," AMA *Arch. Neurol. Psychiat.*, vol. 76, no. 2, 1956.

32. Willemin, Louis P., and Karcher, E. Kenneth, Jr. *Development of Combat Aptitude Areas*, PRB Technical Research Report 1110, Personnel Research Branch, Adjutant General's Office, Department of the Army, Washington, January 1958.

33. Janis, Irving L. *Psychological Stress*, John Wiley & Sons, Inc., New York, 1958.

34. Hull, Clark L. *Principles of Behavior*, Appleton-Century-Crofts, Inc., New York, 1943.

35. Hull, Clark L. *A Behavior System*, Yale University Press, New Haven, Conn., 1952.

36. Mowrer, O. Hobart. *Learning Theory and Behavior*, John Wiley & Sons, Inc., New York, 1960.

37. Mowrer, O. Hobart. *Learning Theory and the Symbolic Processes*, John Wiley & Sons, Inc., New York, 1960.

38. White, Robert W. "Motivation Reconsidered: The Concept of Competence," *Psychological Rev.*, vol. 66, no. 5, September 1959, pp. 297-333.

39. Osgood, C.E., Suci, G.J., and Tannenbaum, P.H. *The Measurement of Meaning*, University of Illinois Press, Urbana, 1957.

40. Crawford, Meredith P. "Concepts of Training," in *Psychological Principles in System Development*, Robert M. Gagné (ed.), Holt, Rinehart and Winston, New York, 1962, pp. 301-341.

Appendix A

DESIGN OF STUDIES TO TEST TRAINING HYPOTHESES

The hypotheses deduced from the present model of the stress process propose that the effectiveness of preparatory job training in developing stress resistance during the subsequent job performance is a function of (a) the absolute and relative strengths of background confidence and background despair which the individual brings to the training situation, and (b) the manner in which certain training design variables are employed in the conduct of the training so as to effect maximal increases in situational confidence while holding increases in situational despair to a minimum.

As a step toward design of experimental training studies, a means of assessing background confidence and background despair has been developed (Appendix B) and normative data have been collected to provide a basis for classifying experimental subjects with respect to background confidence/despair characterisitcs.

The training hypotheses then could be tested by (a) selecting groups of individuals representing different levels on the background confidence and background despair measures, (b) administering, to two or more groups selected in this way, different training programs designed to produce differential amounts of stress resistance (while controlling for skill proficiency), and finally, (c) assigning the men to the hazardous job for which the training was preparatory and observe, under these physical harm threat job conditions, the differences in stress resistance developed by the experimental groups.

For the safety of the men as well as for the purpose of testing the hypotheses, the hazardous job situation must be under the complete control of the experimenter. Earlier work had demonstrated the feasibility of creating stressful physical harm threat situations by use of carefully designed and controlled contrived emergencies (7). This procedure was developed following previous unfruitful attempts to develop stress situations in simulated combat exercises. Those attempts had led to the conclusion that the physical context cues that go to make up simulated combat exercises detracted from elicitation of fear simply because they did suggest combat—a condition that every soldier knows is never real unless he is facing a bona fide enemy.

The successful experiences with the contrived emergencies, however, suggest that patterns of psychological stresses similar to those characteristic for types of combat situations can be elicited through careful design of non-combat situations. Requirements include:

(1) The psychological climate during training should equate that of the trainee receiving combat training who knows that he is being prepared for a combat assignment and that combat is dangerous (the effects of this realization during training, of course, vary depending upon world conditions and involvement of the Army in combat). That is, in the experimental situation the soldier should know that following completion of the training he will be assigned to the corresponding hazardous job.

(2) In the experimental situation the soldier should have a job to perform that entails a strong duty mission in general social mores as well as in those of the military system. The soldier outside of combat whose job places the welfare of others in his trust—even, if necessary, at the risk of his own life—is in a position highly similar, in terms of these pressures, to that of the soldier in combat.

(3) The soldier would have to be trained for the job so that the effects of different training procedures could be tested, and controlled observations of the combat soldier's behavior could be made. Unlike the casual bystander at the scene of a natural disaster, the combat soldier has received training for the job he is to perform in the stressful (combat) situation. This training presumably provides him with the basic skills and knowledges he will need; in addition, it defines the goals or objectives he is expected to identify and strive for during the stressful experience. Without prior training, individuals may differ widely in their interpretation of what their mission is supposed to be while carrying out the job. In order to study the effects of severe stress on behavior with relevance to the combat soldier, it is necessary to focus the study upon a situation in which the experimental subject has a particular job to perform and is aware of what the job is, and in which the subject has (through training or otherwise) the basic skills and knowledges needed to perform his job.

(4) The job performance should be instrumental to achievement of the mission, in either routine or emergency conditions. In short, the individual must feel that the only resources available to carry out his mission are those under his control.

Execution of a program of research studies carried out as described would involve major difficulties. Use of such contrived job situations would be (although unbeknownst to the subject) objectively safe, but it would nevertheless require exposing the subject to periods of relatively intense subjective experiences of threat. On the one hand, there is the fact that such research would be expected to contribute to the ability of individuals to serve in combat or other hazardous jobs where their own lives, and the lives of others, may depend on their ability to perform effectively. On the other hand, creating distress in individuals by placing them in experimental, subjectively threatening (even though safe) situations in order to study factors that would tend to improve training for effectiveness under stress entails serious problems. Weighing the expected benefits and potential problems in this dilemma would require the most serious consideration.

The two major sets of assumptions involved in this conceptual framework are that (a) pre-stressor procedures which maximize situational confidence and hold increases of situational despair to some lower minimum will produce greater stress resistance when the individual encounters the physical harm threats in the job situation, and (b) the training design factors, when manipulated in the manner described in the training condition hypotheses, will influence the strengths of situational confidence and situational despair, as indicated in these hypotheses.

If, following differential training procedures, the behavioral criterion observations cannot be made on individuals while exposed to the relevant physical harm threat conditions in the job situation, then the first assumption stated above cannot be tested.

If one were willing to accept the assumption that attitudes of Confidence and Despair are of importance in determining stress resistance, then it would still be possible to study the effects of different training design factors on the

development of situational confidence and situational despair—the second proposition stated above. The stress model with its related measures of the background and situational components of Confidence and Despair attitudes provides both a framework and a means of carrying out such studies.

This would represent an important shift in the research objectives stated at the beginning of this report. Instead of studying the effects of different preparatory procedures on an individual's stress resistance, the research would now be focused on factors affecting the strengths of Confidence and Despair attitudes during the course of skill training for hazardous jobs. The objective of this effort would be to learn how the development of situational confidence and situational despair can be controlled most effectively in training while proceeding to develop the desired level of skill proficiency.

Research effort might be directed toward such topics as:

(1) How techniques required for optimal development of situational confidence and despair differ for individuals coming to training with differing levels of background confidence and despair.

(2) How these techniques differ as one examines hazardous duties differing on dimensions such as (a) the individual's degree of control over the hazards, (b) the complexity of the individual's task, and (c) the degree of physical harm threat perceived by the trainees, prior to training, as being inherent in the task.

(3) What differences in training techniques are required in order to effect an optimal balance in situational confidence and despair as restrictions are placed on the level of skill proficiency to be developed in the training.

In addition, still within this framework, there are important questions to be explored regarding the effects of different levels of situational confidence and despair, established early in training, upon subsequent learning during the remainder of this training and on retention following completion of the training.

Applied psychologists have, perhaps rightfully, become more than a little jaded in their response to studies employing attitudinal criteria when the ultimate applied question was one of performance. However, assumptions continue to be made regarding the importance of confidence-related attitudes in influencing the likelihood that the man, in a stressful situation, will apply the skills acquired during training. If the validity of these assumptions cannot be tested, and we are going to continue with them, perhaps it is time for some attention to be given to a systematic study of the development of confidence-related attitudes during training for hazardous jobs.

Appendix B

ASSESSMENT OF THE CONFIDENCE AND DESPAIR ATTITUDES

RESEARCH OBJECTIVES

An individual enters training for a hazardous job with certain strengths of Confidence and Despair attitudes acquired over the course of his previous life experiences in the various physical harm threat situations he has encountered. These attitudes correspond to the background confidence and background despair components described in the stress process model (Chapter 3).

During his training, as he acquires specific job skills, he also develops certain strengths of Confidence and Despair attitudes that are relatively specific to the hazardous job situation. These attitudes correspond to the situational confidence and situational despair components described in the model.

The individual's potential stress resistance when he enters the hazardous job situation is assumed to be a function of the combined strengths of background and situational confidence versus the combined strengths of background and situational despair. Thus, if we are to predict an individual's potential stress resistance, we must be able to assess the strengths of both the background and the situational components. To study the effects of training procedures, assessment of both background and situational components is necessary since the effectiveness of training in maximizing situational confidence and minimizing situational despair probably will vary with the strengths of the background components the individual brings to the training.

As the essential feature of the model of the stress process developed, exploratory research was undertaken by HumRRO Division No. 3 to develop methods of assessing the strengths of the background and situational components of the Confidence and Despair attitudes. The development and initial testing of two measures is described in this appendix; samples of the measures are shown in Appendices C and D.

DESCRIPTION OF THE INSTRUMENTS

Since the strengths of the background components of the Confidence and Despair attitudes are already well established in the young adult, it is assumed that short training programs would not appreciably modify their respective strengths. In studying the relative effects of different training techniques on the development of confidence, these measures of the background components would serve primarily as control variables.

Training effects should, however, be reflected in modification of the situational confidence and situational despair components. Measures of these two situational components then would serve as criteria for the relative effects of different training procedures on the Confidence and Despair attitudes.

Two types of assessment devices were therefore developed. The Activities Inventory, Form PH, provided an index of the strengths of background

confidence and background despair. The Situational Confidence - Despair Rating (SCD Rating) provided an index of changes in the relative strengths of situational confidence versus situational despair from one point in time to some subsequent point in time (see Appendix D).

Assessment of the Background Components: The Activities Inventory

The Activities Inventory consists of a list of 30 activities frequently engaged in by young males during their school-age years. In Part I the subject rates, on a four-point scale, the frequency with which he has engaged in each of the 30 activities during his past life; in Part II he indicates the frequency with which confidence—or despair—feelings have been generated during the times that he has been engaged in the particular activity. By use of a nominal weighting system, the frequency rating for a specific activity in Part I is combined with the frequency of confidence-feeling rating in Part II; these weighted scores are then summed over the 30 activities to obtain the background confidence score (see Appendix C). A similar procedure results in the background despair score.

Rationale

According to the stress process model, increments to background confidence occur and accumulate in time over various activity situations when (a) the activity situation elicits some degree of physical harm threat, and (b) there is a reduction in the intensity of stimulation produced by the physical harm threat response. Increments to background despair also occur and accumulate in time over different activity situations when (a) the activity situation elicits some degree of physical harm threat, and (b) the individual experiences some degree of physical trauma (occurrence of an internal damage response) such as bruises, cuts, broken bones, and so forth.

Development of the Activities Inventory

Increments to the strength of the background confidence component could occur in either of the following types of circumstances:

(1) The environmental physical harm stimuli are eliminated or neutralized as a result of forces or actions independent of the individual. For example, the threat source may be eliminated by the action of others or by natural forces.

(2) Manipulative action taken by the individual controls or neutralizes the environmental threat stimuli, either directly as a result of his own behavior or indirectly by obtaining assistance from others.

The Activities Inventory is comprised of activities in which the individual would generally have to take manipulative action in order to control or neutralize the environmental threat stimuli while continuing to engage in the activity. The activities included are those most likely to occur during the school-age years. Occupational activities were purposely excluded because the population of primary interest was the recent high school graduate the activities represented were to be ones in which engagement or nonengagement could generally be considered a voluntary decision.

A pool of activities was compiled and reduced to a total of 50 different activities. The criteria for this initial selection were: (a) Engagement in the activity would involve manipulative activity to control some degree of physical harm threat; (b) engagement would not require practice of an occupation as a prerequisite; (c) the activity would be of the type a boy might engage in at any

time during the first 18 years of life; and (d) a wide range of activities would be included to avoid biasing due to regional geographic differences or socio-economic differences.

Activities were next identified in terms of their potential for evoking different relative intensities of physical harm consequences, in order to restrict the inventory items to those activities tending to evoke the more intense physical harm threat response stimulation.

Pilot administrations of four different forms of severity rating instructions were carried out to resolve questions related to wording. In addition, the resulting data illustrate the stability of the rank order of severity ratings for the 50 activities over these four different samples of subjects (N = 311). Rank order correlations (rho) obtained between these different sets of instructions, based on the mean severity ratings obtained within each group of subjects for each item, ranged from .89 to .95.

In view of the stability in rank order, the data from these administrations were used to tentatively identify 30 items receiving the highest severity ratings out of the pool of 50 items, to comprise the Activities Inventory (Form PH).

As a result of the experience with the four pilot forms of the severity rating instructions, a final, revised form was decided upon:

> If a person were to be injured while engaging in each of the activities listed below, how serious do you think this injury could be? Draw a circle around your answer. Answer each item that you know something about even though you may not have engaged in the activity. If you know nothing about the activity, circle the number of that item and go on to the next one.

1. Soccer
   minor injury moderate serious critical injury

In order to check on stability in the rank ordering of activities based on this revised form of instructions, the fifth form was administered to three groups of recruits numbering approximately 100 men per group. Rank order correlations ranged from .92 to .98.

In each group, two mean severity ratings were computed on each of the 30 items tentatively selected for the Activities Inventory, by separating the data of the subjects who had and had not engaged in the given activity. Rank order correlations between the "engagers" and "nonengagers" in the three groups ranged from .81 to .86. Rank order coefficients obtained on the severity rankings accorded the 30 activities by the combined "engagers" and "nonengagers" in each of the three groups ranged from .94 to .96.

Table B-1 presents the mean severity ratings (Form 5) for each of the 30 items comprising the present form of the Activities Inventory, with the items listed in order from most to least severe.

Normative Data

The Activities Inventory was administered to 956 Army inductees during August 1963. This group comprised all inductees being processed into the Army at the Fort Ord Reception Station during a period of about two weeks. This data collection was carried out to obtain distributions of background confidence scores and background despair scores, which were then used as normative data for the establishment of decile intervals on both distributions. The resultant score distributions with mid-interval percentile ranks are presented in Table B-2.

Table B-1

Rank Order and Mean Severity Ratings for Items of the Activities Inventory

Item No.	Description	Mean ($N = 336$)	Rank
25	Knife fights	3.81	1
40	Hunting	3.63	2
23	Riding a motorcycle	3.60	3
20	Drag racing	3.57	4
9	Driving a truck or truck-trailer	3.55	5
26	Stealing rides on the outside of moving freight cars	3.54	7
27	Stealing rides on outside of moving cars or trucks	3.54	7
28	Driving a car	3.54	7
3	Skeet and target shooting	3.50	9
6	Boxing	3.42	10
22	Mountain climbing	3.36	11
14	Skin diving	3.32	12
2	Tackle football	3.30	13.5
7	Judo	3.30	13.5
4	Ice hockey	3.06	15
19	Jumping from heights of 10 feet or more	3.03	16
12	Snow skiing	3.02	17
8	Swimming	2.99	18
18	Diving into water from heights of 10 feet or more	2.96	19
15	Surfboard riding	2.89	20
17	Horseback riding	2.84	21.5
29	Archery	2.84	21.5
5	Rugby	2.83	23
11	Water skiing	2.80	24.5
21	Climbing trees	2.80	24.5
24	Fist fights	2.76	26
30	Sledding or tobogganing	2.72	27
16	Boating or canoeing	2.54	28
1	Soccer	2.52	29
13	Water polo	2.39	30

Table B-2

Decile Equivalents of Background Confidence and Background Despair Scores[a]

Decile Equivalent	Confidence Score Interval	Despair Score Interval
1st	0-19	0-6
2nd	20-27	7-10
3rd	28-33	11-13
4th	34-39	14-17
5th	40-46	18-19
6th	47-51	20-23
7th	52-57	24-27
8th	58-65	28-31
9th	66-76	32-36
10th	77-180	37-180

[a]Decile equivalents are based on Reception Station sample ($N = 956$).

Assessment of the Situational Components: The SCD Rating

The Situational Confidence - Despair Rating consists of 13 pairs of words. Each pair is assumed to represent opposing poles of a despair-confidence continuum divided, for rating purposes, into seven intervening segments. The respondent chooses and checks one of the seven segments in terms of its relative position between the two polar words. The rating instructions given the respondent retain the same general form for each situation, skill, or manipulative response under investigation, but the focus is modified to suit the specific item. Instructions used in a pilot study of rifle marksmanship training provide an example (Appendix D).

The rating is scored by summing over the weights of 1 through 7 assigned to the rating for each of the 13 word pairs. The weight of 1 is assigned to the despair end of the continuum and the weight of 7 to the confidence end. Thus, a score of 13 would represent the strongest despair score possible while a score of 91 would represent the strongest confidence score possible. A score of 91 indicates that Confidence-related attitudes are considerably stronger than Despair-related attitudes at this point in time. Changes in SCD Ratings with repeated administration during the same stressor or training situation are assumed to reflect changes in the relative strengths of situational confidence and situational despair.

Rationale

The conceptualization assumes that situational confidence and situational despair are two separate internal response tendencies. For example, a given threat situation may strengthen both response tendencies; another situation may weaken one response tendency while strengthening the other. Thus, in measurement terms, the strengths of situational confidence and situational despair represent two distinct dimensions.

In establishing measures, the objective is to detect and assess, in a given situational setting, the presence, on the one hand, of anticipatory manipulative responses, which have associative connections with the Confidence response, and, on the other hand, of anticipatory damage responses, which have associative connections with the Despair response.

The SCD Ratings provide an index to relative strengths of situational confidence and situational despair, rather than a direct separate measure of confidence and despair. Assume two individuals matched for strengths on both the background confidence and background despair components; Individual A receives training hypothesized to maximize the strength of the situational confidence component and minimize the strength of the situational despair component, and Individual B receives training hypothesized to have the inverse effect. A measure applied before and after training to reflect a change in the strength of situational confidence relative to the strength of situational despair would satisfy the minimum criterion requirement, even though it did not measure each of the two situational components separately. The SCD Rating was designed to satisfy this requirement.

From a theoretical point of view, this type of assessment has a disadvantage: If an individual's SCD Rating scores went up during training, it would not be clear whether situational confidence had been increased relatively more than situational despair, situational confidence had remained the same but situational despair had been decreased, or situational confidence had been increased at the same time that situational despair had been decreased.

Practically speaking, however, whatever the explanation, the net effect should still be increased stress resistance.

Development of the SCD Rating

In selecting items for the SCD Rating, three requirements were imposed:

(1) The words must be relevant to anticipatory feelings under conditions where expectations of successful outcome or control of threat as a result of the performance—and, conversely, anticipations of physical harm consequences associated with the actual job performance—ranged from weak to strong.

(2) The words must not themselves be ones corventionally considered as reflecting points on affective dimensions of quality and intensity. For example, on words such as nervous, jumpy, and scared, the direction and intensity of affect could occur regardless of which attitudinal factor (Confidence vs. Despair) predominates.

(3) The words must be sufficiently general to be used in securing ratings on a wide range of performance acts or situations.

An initial pool of 350 words was formed from existing adjective check lists and suggestions by staff members. Seven pairs of words were selected from this pool by a screening process. The remaining six pairs were added to give a broader representation to degree of expectation of success or failure.

BACKGROUND AND SITUATIONAL ATTITUDES IN AN OPERATIONAL TRAINING PROGRAM

A pilot study was conducted to obtain data on the sensitivity of the assessment devices in an operational training situation. The Army rifle marksmanship training program was chosen as the specific skill training situation. The first available company of basic trainees served as subjects.

The Activities Inventory and the SCD Ratings were administered in that order and during the same classroom session to a total of 205 trainees, at the end of the first week of their basic training and just before their rifle marksmanship training was started.

Four subsequent readministrations of the SCD Rating took place. Three were at different stages of the rifle training (at the end of the second week of BCT, at the end of the third week, and early in the fourth week), and the final administration was approximately four weeks after completion of the rifle marksmanship training and just prior to the trainee's graduation from Basic Training.

These data will be used to examine two questions:

(1) Do the data reflect the expected relationship between the strengths of the Confidence and Despair attitudes which the individual brings to the training situation (Activities Inventory) and the strengths of the Confidence versus Despair attitude as assessed at the initiation of the training (pretraining SCD Rating)?

(2) Do trainees exhibit the expected increase in situational confidence relative to situational despair that would be expected in reasonably well designed hazardous skill training?

Confidence-Related Attitudes at the Start of Training

The general hypothesis to be tested was that individuals with high levels of background confidence and low levels of background despair would exhibit the highest pretraining SCD Ratings relevant to the given job performance;

conversely, individuals with low background confidence and high background despair would exhibit the lowest pretraining SCD Rating scores.

Activity Inventory scores for background confidence and background despair were coded into decile intervals on the basis of cutting scores established from the previously collected normative group of 956 Army inductees. These decile intervals were used to establish a 10x10 matrix as shown in Table B-3; the row and column headings show the raw score intervals corresponding to each decile code. Cell entries are the number of individuals from the pilot study group who were so classified; all cells falling to the left of the diagonal have decile scores for background confidence which exceed their corresponding decile score for background despair, and the converse is true for those cells falling to the right of the diagonal.

The hypothesis relating the background component scores to the SCD Ratings assumes that the SCD Ratings will be a function of both the absolute and the relative strengths of background confidence and background despair. This would lead us to expect that the highest pretraining SCD Rating would be obtained by individuals having the combination of Background Confidence (decile) scores of 10 and Background Despair scores of 1, and the lowest rating by individuals having Background Confidence 1 and Background Despair 10. We would further expect that if, for example, we moved to the right within a row in Table B-3, thereby increasing the magnitude of background despair, there would be a progressive decrease in the pretraining SCD Ratings (cell means).

A very large pool of subjects would be required to insure the representation in the various cells necessary for study of the more detailed aspects of this hypothesis. This pilot study was addressed simply to demonstrating whether individuals whose background confidence exceeded their background

Table B-3

Matrix Used in Forming Levels Based on Combinations of Background Confidence and Background Despair Scores[a]

		Background Despair										
	Decile	1	2	3	4	5	6	7	8	9	10	
Background Confidence: Decile	Raw Score Interval	0-6	7-10	11-13	14-17	18-19	20-23	24-27	28-31	32-36	37-180	Σf
1	0-19	1	1	2	2			2	1			9
2	20-27	3	3	1	6	2	1			2		18
3	28-33	1	1	1	1	2	3	4			1	14
4	34-39			1	5	1	1	4	2	1	2	17
5	40-46		1	1	2	3	4	6	2	4	4	27
6	47-51	1			2	1	4	3	2	1	4	18
7	52-57		1	2	1		3	3	1	4	4	19
8	58-65	1	1	3	1		3	1	2	3	7	22
9	66-76	2	1		1	3	3	1	2	1	10	24
10	77-180		3	1	3	1	2	4	3	3	17	37
	Σf	9	12	12	24	13	24	28	15	19	49	205

[a]Cell entries show the frequency distribution for the rifle marksmanship subjects. Shading denotes the diagonal of the matrix for which the Confidence and Despair deciles are equal.

despair exhibited higher SCD Ratings than those whose background despair exceeded their background confidence.

In testing this hypothesis, three groups were differentiated:

Cd – All subjects whose Background Confidence decile score exceeded their Background Despair decile score.
Dc – All subjects whose Background Despair decile score exceeded their Background Confidence decile score.
C = D – All subjects whose BC and BD scores were in the same decile.

As shown in Table B-4, the mean pretraining SCD Rating for the Cd group is larger than the corresponding mean for the Dc group. These data are consistent with the general hypothesis that the relative strength of confidence versus despair feelings (SCD Ratings) with which an individual initiates training will be a function of the strength of Confidence and Despair attitudes (background confidence and background despair) accumulated over a range of past experiences in physical harm threat situations.

Under the conceptualization of the pilot study, it would be expected that individuals with no prior weapons experience who are in the Cd group would begin training with higher SCD Ratings than would their counterparts (i.e., with no prior weapon experience) in the Dc group. With an Activities Inventory item on prior experience in target or skeet shooting as the criterion, 71 of the 205 trainees indicated no prior experience with weapons. The remaining 134 had engaged in the activity to varying extents.

The analysis shown in Table B-5 (part A) supported the hypothesis. It would appear that, if an individual has no previous, directly relevant experience

Table B-4

Comparison of Mean Pretraining SCD Ratings of Groups Having Different Combinations of Background Confidence (BC) and Background Despair (BD) Scores

Group*	Pretraining SCD Rating			Comparison			
	N	Mean	σ^2				
Cd	64	66.7	190.2	Cd	vs	Dc	$p<.01$
C = D	40	62.2	201.5	Cd	vs	C = D	NS
Dc	101	56.5	204.2	Dc	vs	C = D	$p<.01$

*Cd: Subjects whose BC decile score exceeded their BD decile score.
C = D: Subjects whose BC and BD scores were in the same decile.
Dc: Subjects whose BD decile scores exceeded their BC decile scores.

Table B-5

Comparison of Mean Pretraining SCD Ratings for Background Confidence and Background Despair Groups on the Basis of Prior Weapon Experience

Group	*N*	Mean	σ^2	Comparison
A. Nonengagers (no prior weapon experience)				
Cd	15	64.5	121.41	$p<.01$
Dc	42	52.2	212.31	
B. Engagers (prior weapon experience)				
Cd	49	67.4	212.36	$p<.01$
Dc	59	59.6	178.76	

with a hazardous performance skill, his initial level of confidence-despair will be dependent upon the strengths of background attitudes accumulated over a range of past experiences in physical harm threat situations.

Changes in Confidence-Related Attitudes Accompanying Training

The repeated administration of the SCD Ratings during and after completion of rifle marksmanship training provided the opportunity to explore changes in situational confidence and despair accompanying this training.

Table B-6 presents the means for the five SCD Rating administrations for the three Background Confidence-Background Despair groups. Out of the overall sample of 205 trainees, completed SCD Rating data were available on 133 trainees. By omitting the third administration, complete data were available on 158 trainees, with administrations number 1, 2, 4, and 5 representing successive mean SCD Ratings obtained on the identical individuals. Since the means of the three groups for the third administration did not follow a different pattern from the other administrations, this administration is omitted from the remaining analyses in order to use the data for the larger N in administrations 1, 2, 4, and 5.

Table B-6

Mean SCD Ratings of Background Confidence and Background Despair Groups Before, During, and After Rifle Marksmanship Training

Administration	*N*	Mean	σ^2
1. Prior to Training (end of 1st week of BCT)			
Cd	49	65.0	192.8
C=D	27	60.8	209.2
Dc	82	56.6	166.7
2. End of First Firing Phase (end of 2d week of BCT)			
Cd	49	77.4	112.2
C=D	27	77.3	138.0
Dc	82	70.7	183.5
3. End of Field Firing Phase[a] (end of 3d week of BCT)			
Cd	36	75.0	198.2
C=D	26	72.3	267.8
Dc	71	69.5	177.3
4. End of Record Firing (start of 4th week of BCT)			
Cd	49	74.0	156.3
C=D	27	72.4	202.8
Dc	82	69.7	150.5
5. End of Basic Training (8th week of BCT)			
Cd	49	76.5	152.3
C=D	27	73.8	322.6
Dc	82	70.9	149.3

[a]To minimize the number of subjects who would have to be dropped because of incomplete data on the successive SCD administrations, administration 3 was excluded from further analyses.

The trends of the successive SCD Rating means for the two major groups, Cd and Dc, were analyzed as summarized in Table B-7.[1] In this analysis, the hypothesis that the two curves (Cd versus Dc) shown in Figure B-1 are parallel was tested, and it was concluded that, in this training program, confidence develops in essentially a parallel pattern for both the Dc and the Cd groups.

Table B-7

Analysis of Variance of Repeated Administrations of SCD Ratings Obtained on Rifle Marksmanship Skills for Background Confidence and Background Despair Groups

Source of Variance	*df*	Sums of Squares	Mean Squares	*F*	*p*
Between Subjects	130	50,721.56			
Group	1	4,778.16	4,778.16	13.42	<.01
Error (between)	129	45,943.40	356.15		
Within Subjects	393	52,740.00			
Administration	3	16,291.65	5,430.55	58.11	<.01
Administration X Group	3	284.48	94.83	1.02	
Error (within)	387	36,163.87	93.45		
Total	523	103,461.56			

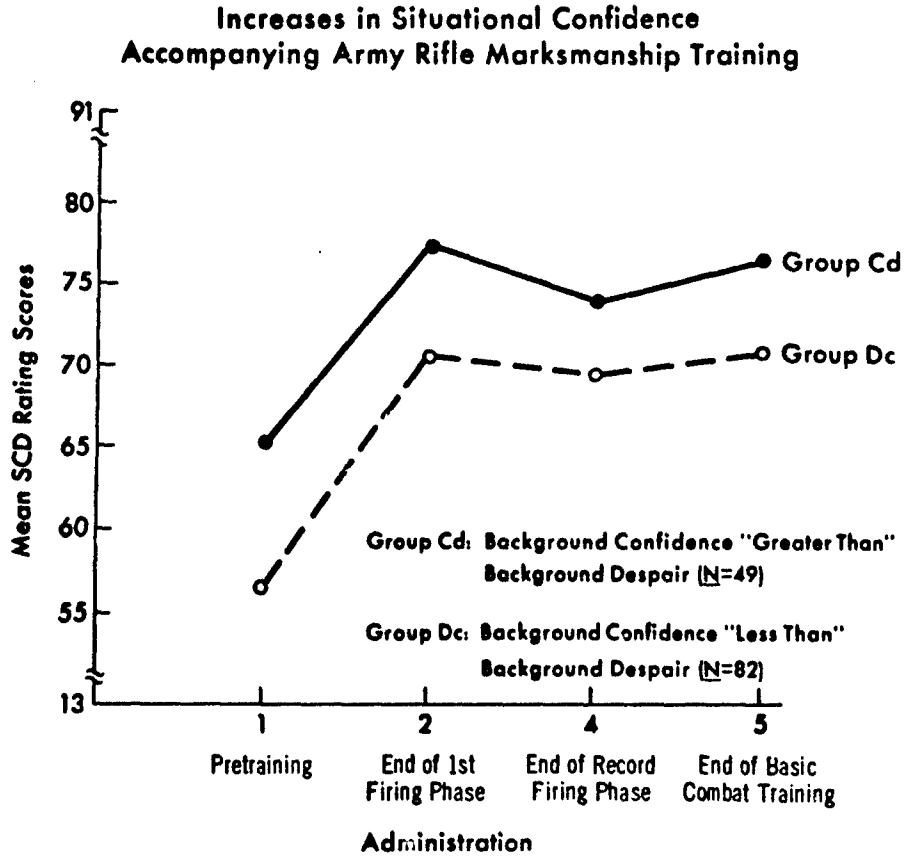

Figure B-1

[1]The statistical design utilized was the Type I design as described in E.F. Lindquist, *Design and Analysis of Experiments in Psychology and Education*, Houghton Mifflin Co., The Riverside Press, Cambridge, Mass., 1953.

Test of the hypothesis that the curve for group Cd falls at the same level of score magnitude as does the curve for group Dc showed that the Cd group scores were significantly higher than the Dc scores. Separate tests comparing the SCD Rating means for the Cd and Dc groups on each administration indicated that the differences in means (except for administration 4) were significant at the .05 level.

Thus, (a) both groups develop increases in confidence at about the same rate and with about the same fluctuations from one administration to the next, and (b) the Cd group starts and tends to maintain throughout the training a higher level of confidence relative to despair than does the Dc group.

The largest increase in mean SCD Ratings for each group occurred from the first to the second administration. Since the SCD Rating was designed to describe the course of development of Confidence versus Despair attitudes during training, the reliability of the differences between successive SCD Rating means for each group was investigated.

The mean differences between successive administrations were computed separately for groups Cd and Dc and are shown in Table B-8. The tests of the mean differences indicate that the Dc group reached its maximum level on SCD Ratings on the second administration and then remained at this level throughout the rest of the Basic Combat Training cycle. The Cd group also reached its maximum level of SCD Ratings on the second administration but then exhibited a small decrease on the fourth administration, followed by a small increase at the end of BCT.

Table B-8

Development of Confidence vs. Despair During Rifle Marksmanship Training for the Background Confidence and Background Despair Groups Considered Separately

Group Cd		Group Dc	
Administrations	Mean Differences[a]	Administrations	Mean Difference[a]
1 vs. 2	12.4*	1 vs. 2	14.1*
1 vs. 4	9.0*	1 vs. 4	13.1*
1 vs. 5	11.5*	1 vs. 5	14.3*
2 vs. 4	-3.4*	2 vs. 4	-1.0
2 vs. 5	-0.9	2 vs. 5	0.2
4 vs. 5	2.5*	4 vs. 5	1.2

[a]*indicates the value is statistically significant ($p<.05$). The t-tests were made using the within mean-square-error estimate shown in Table B-7.

Conclusions in Pilot Study

This pilot study resulted in two principal conclusions:

(1) The Activities Inventory provides a means for categorizing individuals on the basis of the differential strengths of their Background Confidence and Background Despair scores. These levels, based on the strengths of Confidence and Despair attitudes accumulated over a range of past experiences in physical harm situations, are related to the strength of confidence (relative to despair) which the individual experiences as he prepares to enter a specific skill training situation.

(2) The SCD Rating reflects expected increases in confidence relative to despair following the actual initiation of the rifle marksmanship training.

These results support the feasibility of using these two measures as means of assessing the effects of experimental training techniques on the development of Confidence and Despair during hazardous job training. These research tools can be used to study the development of these attitudes during skill training so as to identify training procedures which are most effective in maximizing development of Confidence.

Appendix C

FORMAT AND SCORING OF ACTIVITIES INVENTORY

Description of Inventory

The 30 items (see Table B-1) contained in Activities Inventory I are repeated with identical numbering and sequence in Activities Inventory II. The distinction between Part I and II is in the instructions. Part I asks for the subjects' frequency of engaging in each of the activities. Part II asks two separate and distinct questions involving confidence and despair feelings generated during the times the subject has been engaged in the various activities.

The activities listed were chosen from a much larger pool on the basis of Army trainees' ratings of the severity of potential physical harm danger involved in engaging in each activity. The rank order of these severity ratings of the larger pool of activities remained very stable over different samples of trainees. The 30 items represent the items in the pool which received the 30 most severe ratings.

Scoring Procedure

The frequency (f score) is derived from Activities Inventory I for each item by scoring responses to the item as follows:

Never = 1; Few Times = 2; Many Times = 3; Most Times = 4.

The background confidence score is derived by taking for each item for a given subject the "f" score (Activities Inventory I) and the "a" or confidence score (Activities Inventory II), entering the scoring table (Table C-1), and

Table C-1

Activities Inventory Table for Obtaining Weighted Confidence or Despair Scores for Each Item

Activities Inventory I: Frequency Score	Activities Inventory II: "a" or "b" Score*			
	1	2	3	4
1	0	0	0	0
2	0	1	2	3
3	0	2	4	5
4	0	3	5	6

*The background *confidence* score for a given subject is obtained by summing the weighted "a" scores obtained for each of the 30 activity items. The background *despair* score for a given subject is obtained by summing the weighted "b" scores obtained for each of the 30 activity items.

reading the value in the cell which is a weight for the particular combination of frequency-of-engaging and quality-of-experience with which the table was entered. These combination weights are obtained for each of the 30 activities for each subject. The sum of these weights for a given subject, for the 30 activities, yields his background confidence score.

A similar procedure is followed in getting background despair scores. In this instance, the item "f" scores from Activities Inventory I are used in conjunction with the item "b" or Despair score from Activities Inventory II to enter the scoring table. The weight thus obtained for a given subject's "f" and "b" responses to each activity is summed over all activities to yield his background despair score.

ACTIVITIES INVENTORY II
FORM PH

For each of the items in this inventory there are two parts. Out of all the times you have engaged in the activities listed below how often have you had the feelings described in each of the two different parts? Mark your answer by drawing a circle around the word which best describes how often you've had each of these feelings while engaging in the activity. Be sure to answer all two parts.

If you have never engaged in the activity simply circle the number of that item and go on to the next one.

Example:

1. During the times that I have ridden broncos, I can remember having felt:

(a) a confident "I can handle anything that comes up" feeling:	never	few times	many times	most times
(b) an uneasy "something bad is going to happen" feeling:	never	few times	many times	most times

This would mean that during the times that you had ridden broncos, many of the times you had a confident "I can handle anything that comes up" feeling, and that during most of the times you had an uneasy "something bad is going to happen" feeling.

---

1. During the times that I have played soccer, I can remember having felt:

(a) a confident "I can handle anything that comes up" feeling:	never	few times	many times	most times
(b) an uneasy "something bad is going to happen" feeling:	never	few times	many times	most times

2. During the times that I have played tackle football, I can remember having felt:

(a) a confident "I can handle anything that comes up" feeling:	never	few times	many times	most times
(b) an uneasy "something bad is going to happen" feeling:	never	few times	many times	most times

ACTIVITIES INVENTORY I*
FORM PH

In this test you are to mark how often you have engaged in certain activities. For each of the items below, answer by placing a circle around the word which best describes how often you have engaged in the activity.

1.	I have played soccer:	never	few times	often	very often
2.	I have played tackle football:	never	few times	often	very often
3.	I have engaged in skeet and target shooting:	never	few times	often	very often
4.	I have engaged in ice hockey:	never	few times	often	very often
5.	I have played rugby:	never	few times	often	very often
6.	I have engaged in boxing:	never	few times	often	very often
7.	I have engaged in judo:	never	few times	often	very often
8.	I have gone swimming:	never	few times	often	very often
9.	I have driven a truck or truck-trailer:	never	few times	often	very often
10.	I have gone hunting:	never	few times	often	very often
11.	I have gone water skiing:	never	few times	often	very often
12.	I have gone snow skiing:	never	few times	often	very often
13.	I have engaged in water polo:	never	few times	often	very often
14.	I have gone skin diving:	never	few times	often	very often
15.	I have engaged in surfboard riding:	never	few times	often	very often
16.	I have gone boating or canoeing:	never	few times	often	very often
17.	I have gone horseback riding:	never	few times	often	very often
18.	I have dived into water from heights of 10 feet or more:	never	few times	often	very often
19.	I have jumped from heights of 10 feet or more:	never	few times	often	very often
20.	I have engaged in drag racing:	never	few times	often	very often
21.	I have climbed trees:	never	few times	often	very often

*For complete list of items, see Table B-1.

Appendix D

SITUATIONAL CONFIDENCE - DESPAIR RATING

Last Name First M.I.

Army Serial Number

Use the pair of words listed here to DESCRIBE YOUR PRESENT KNOW-HOW OR SKILL WITH THE M-14 RIFLE IF, WITHOUT FURTHER TRAINING, YOU HAD TO RELY ON YOUR ABILITY TO USE THE M-14 EFFECTIVELY IN COMBAT.

Place your mark in any one of the seven spaces between each pair of words. The closer your mark is to one word of the pair means the closer you feel that word comes to describing you and the less descriptive is the other word of the pair.

If you think one of the words does not fit you any better than the other word of the pair, then fill in the space mid-way between the two words.

For example, if you feel the word "good" describes very closely your present know-how or skill in using the M-14 rifle in combat then you would blacken in the space closest to the word "good."

BAD ○1 ○2 ○3 ○4 ○5 ○6 ●7 GOOD

1.	weak	1 2 3 4 5 6 7	strong
2.	hopeless	1 2 3 4 5 6 7	hopeful
3.	worst	1 2 3 4 5 6 7	best
4.	unskilled	1 2 3 4 5 6 7	skilled
5.	failure	1 2 3 4 5 6 7	successful
6.	doomed	1 2 3 4 5 6 7	safe
7.	helpless	1 2 3 4 5 6 7	masterful
8.	bungling	1 2 3 4 5 6 7	expert
9.	awkward	1 2 3 4 5 6 7	smooth
10.	loser	1 2 3 4 5 6 7	winner
11.	doubtful	1 2 3 4 5 6 7	confident
12.	unlucky	1 2 3 4 5 6 7	lucky
13.	timid	1 2 3 4 5 6 7	bold

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DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

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Factors Related to Effectiveness and Ineffectiveness of Individuals in Combat	Office, Chief of Research and Development Department of the Army Washington, D.C. 20310

ABSTRACT

On the basis of reported observations of the behavior of individuals under various prolonged physical harm conditions, a sequential pattern of behavioral reactions is described, reflecting the behavioral manifestations of a stress process. This sequential pattern of behavior would be expected, over time, to apply to any individual in any severe physical harm threat. The rate of development of this behavioral pattern under a given set of environmental stressor conditions represents the individual's stress resistance. A conceptual model was developed to describe the mode of operation of key attitudinal variables and environmental stressor variables in producing this behavioral pattern as well as the individual differences in stress resistance. Design of training to increase stress resistance in combat or other hazardous jobs is discussed from the basis of this conceptual framework.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Combat Stress						
Stress-Retardant Training						
Training Design						
Stress Resistance						
Performance Effectiveness						
Stress Process						
Hazardous Jobs						
Attitudinal Assessment						
Feedback Cues						
Physical Harm Threat						
Fractional Anticipatory Responses						
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