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10. Models of Stress

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THE PRIMARY purpose of this chapter is to survey existing conceptual models of stress in order to evaluate the contribution each has made to our present understanding of stress phenomena. The chapter is divided into four sections. Section I identifies and briefly describes each of the major conceptual models of stress; in Section II each conceptual model is critically evaluated in terms of its contribution to existing knowledge; Section III contains our attempt to derive a unified, comprehensive stress model, and in Section IV we attempt to reinterpret previous stress models in terms of our own model.

I. EXISTING CONCEPTUAL MODELS OF STRESS

Eight basic conceptual models have been proposed to explain the phenomena of stress. Six of these were explicitly formulated by

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researchers, who then used them as a guide for their own studies of stress, the remaining two exist in the form of implicit assumptions contained in many medical and psychiatric studies of the responses of individuals to conditions of extreme duress. A brief description of each of these eight models follows.

1. Mechanic (1962) has formulated a model of stress for the purpose of interpreting selected problems concerned with the social psychology of adaptation. This model was developed in order to interpret the findings of a study of graduate students while they prepared for and took qualifying examinations for the doctoral program in the department of sociology at a large state university Mechanic defines stress as "the discomforting responses of persons in particular situations (1962, p. 7)." Whether or not a situation, event or happening produces discomforting responses depends upon four factors: the ability and capacity of a person, skills and limitations produced by group practices and traditions; the means provided to individuals by the social environment; and the norms that define where and how an individual may utilize these means. The successful mastery of a situation, and the feelings that are aroused in the process are termed reversibility Reversibility depends upon adaptive devices consisting of thoughts and behavior relevant to one's situation or to feelings about it. If behavior is relevant to situational demands, it is termed coping behavior. The term "defense" is used in reference to behavior and thoughts aimed at managing feelings evoked by the situation and the coping behavior This stress model was developed for, and applies most appropriately to the social and social-psychological level of functioning in the organism.

2. Basowitz and his associates (1955) developed a model of stress based upon a study of men in combat. The central concepts in this model are "anxiety," "stress," and "stress situations" (1955, p. 54). Anxiety is defined as a conscious and reportable experience of intense dread and foreboding. Such feelings typically arise when the integrity of the organism is in some manner threatened. In theory, any stimuli may threaten the integrity of an organism and thereby produce the experience of anxiety; empirically, some stimuli are more likely than others to produce anxiety Stress refers to this latter class of stimuli. Stimuli form a continuum based on differential meaning to the organism and on the anxiety-producing potential they have. At one end of this continuum are stimuli that have meaning only to a single individual or a few persons; at the other end of the continuum are stimuli that, because of their intensity and their explicit threat to vital functions, are likely to overload the capacity of

most organisms. Basowitz uses this idea to designate as stressful certain kinds of stimuli without regard to response. Such stimuli are regarded as stressful because of their assumed or potential effect, even though it is recognized that they may provoke differing responses. By virtue of their assumed generality, these are referred to as stress situations. This model has been used primarily to interpret the responses of groups of persons who are simultaneously subjected to conditions of extreme duress.

3. Studies by Alexander (1950), Dunbar (1947), and Grinker and Spiegel (1945) have produced the psychosomatic model of stress. The psychosomatic model is based on the premise that the tensions and strains that occur in one system of the body often have pathological consequences for other body systems. Anxiety or fear generated by serious conflicts in a person's life may be expressed not only through subjective feelings of intense dread and discomfort, but through alterations in basic physiological processes as well. Such basic physiological reactions occur when the organism's responses to provoking circumstances are inappropriate. Solvable conflicts handled directly, or in an overtly assertive fashion, are less likely to result in significant, sustained alterations in organic processes, since the tension generated by the initial conflict is externally and not internally dissipated. If, however, such conflicts are not confronted directly, the predicted result is that the tension will be internally dissipated, flowing from one bodily system to another and thereby producing certain characteristic organic changes.

4. A fourth model of stress, developed by Wolff and his associates (1950, 1953), is closely related to the psychosomatic model. The principal concept in this model is the "protective reaction pattern." According to this model, when the body is confronted with insults to its physical integrity, a complex reaction occurs aimed at sealing off and then ridding the body of its threat. This process is illustrated by the nasal adaptive reaction induced by inhaling noxious fumes. The reaction consists of intense mucous secretion and tearing, which is aimed at flushing out the nose and eyes, thereby ridding the body of the noxious agent. This same reaction may be set in motion by symbolic as well as by physical threats, and the reactions thereby induced are similar in both instances. This model differs from the psychosomatic model in that the protective reaction pattern is not conceptualized as a chain reaction beginning with feeling states and then progressing to altered bodily reaction and finally to organic abnormality Altered feelings, bodily adjustment, and behavior are considered to occur simultaneously and in varying degrees.

5. A biochemical model of stress has been developed by Hans Selye (1956). This model is basically concerned with an analysis of stress at the physiological and biochemical levels of human functioning. Selye defines stress as "a state manifested by a specific syndrome which consists of all of the nonspecifically induced changes within a biologic system (1956, p. 54)." A nonspecifically induced change is one that affects all, or most parts of a system without selectivity Nonspecifically induced changes are described in terms of the General Adaptation Syndrome, a three-stage process brought about by a specific stressor, or a stress-producing stimulus. The first stage is characterized by an alarm reaction, during which a general mobilization occurs. This phase leads to a stage of resistance, which is characterized by a set of internal responses that stimulate tissue defense. If the stressor continues to affect the organism despite these responses, the third stage—that of exhaustion—is eventually reached.

6. A large number of studies have isolated specific physiological changes that are commonly produced by stressful stimuli. These studies fall into two broad categories: First, there are studies of the effects of stress on such physiological processes as cardiac functioning (Stevenson and Duncan, 1950, pp. 799-817, Wolf, 1948, pp. 1056–76, mucous membrane secretion (Wolff, 1948, pp. 313–34, and gastric functioning (Margolin, 1950, pp. 656–64); second, there are studies of the relationship between stress and the genesis and onset of specific disease syndromes such as cardiovascular disorders (Wolff, 1950), ulcerative colitis (Grace, 1950, pp. 679–91; Lindemann, 1950, pp. 706–23), dermatitis (Kepecs and Robin, 1950, pp. 1010–15), and glaucoma (Ripley, 1950, pp. 523–36). As a rule, these studies do not contain an explicit conceptual model; rather, they are guided by a set of implicit assumptions about stimuli that are stressful, how they operate upon the organism, and why the effects of stress are manifested as they are. An examination of these implicit assumptions suggests a kind of mechanical model of stress. In this model, stress is viewed as the internal response of the organism to an external load placed upon it by some pathogenic agent, stressor, or life crisis. Stress, in turn, produces distinct pathological changes and certain typical disorders of adaptation.

7 Another model of stress, one evolved by Dohrenwend, modifies Selyes' physiological stress model in order to apply it to studies of the prevalence and distribution of mental disorders in the social environment (1961, pp. 294-302). Dohrenwend has isolated five basic sets of factors involved in stress reactions. These are (1) external

stressors that throw the organism into an imbalanced state; (2) factors that mediate or alleviate the effects of the stressor; (3) the experience of stress itself, which is the product of the interaction between the stressor and the mediating factors; (4) the adaptive syndrome, which consists of the organism's attempt to cope with the stressor; and (5) the organism's response, which may be either adaptive or maladaptive.

Mediating factors play a very important role in Dohrenwend's model. Two basic types of mediating factors are identified: those that determine the amount of external constraint associated with stress, and those that determine the amount of inner constraint. External and internal constraint, in turn, produce conditions of external and internal control. External control is experienced when force is exerted in favor of activity that is demanded by outer events. Conversely, internal control is experienced when an individual attempts to inhibit action demanded by outer events in favor of actions demanded by inner events. From this basic paradigm, Dohrenwend then derives eight basic propositions concerning factors that determine the intensity and duration of stress. In this model, stress is defined as a state intervening between antecedent constraints and consequent efforts to reduce constraint. As such, stress is regarded by Dohrenwend as the product of any behavior in response to pressures, regardless of whether the behavior is adaptive or maladaptive.

8. Janis has evolved a model of stress that is basically concerned with psychological responses of individuals to traumatic events. This model is based upon his own studies of victims of air-raid attacks during the war, and of patients undergoing major surgery (1954, pp. 12–25). He also draws heavily on the numerous studies of natural disasters and man-made calamities. His model is comprised of three basic elements: the disaster situation; the psychological responses of individuals to disaster; and intrapsychic and situational determinants of these psychological responses. Janis identifies three major phases of danger found in all large-scale disasters. These are the threat phase, in which persons perceive objective signs of impending danger or in which they receive explicit warnings that some kind of danger might be approaching, but at a time when the immediate environment is still free from the physical impact of the danger; the danger-impact phase, in which persons are actually confronted with physical dangers in their immediate environment such that their chances of escaping injury or death are at least partly contingent upon the speed and efficience of their protective responses; and the danger-of-victimization phase, which usually occurs immediately af-

ter the actual impact of the danger has subsided or terminated, and in which people perceive the variety and magnitude of the losses sustained by themselves and others.

Five types of reactions are associated with these danger phases. These are apprehensive avoidance, in which individuals attempt to escape the situation psychologically by employing the defense mechanism of denial, stunned immobility, in which there is an almost total absence of motor and mental activity, coupled with disorientation; apathy and depression, docile dependency, in which persons show a distinct lack of independent action, and agressive irritability, in which they are often prepared to lash out at anyone who frustrates or angers them in any way These reactions, which usually produce distinctly different consequences, do share one common effect: they all result in a marked drop in mental efficiency

There are two basic factors that determine which of these five basic responses will occur The first concerns characteristics of the danger stimuli that are perceived and experienced by the individual, the second are situational and predispositional determinants, of which Janis identifies seven. These are. 1) previously institutionalized ideologies and rationales concerning the natural cause of disaster· (2) previously formed expectations concerning the ways in which danger situations can be avoided or mitigated, (3) self-conceptions of one's social role in the emergency situation, (4) the degree of identification or affiliation with the psychological groups that are threatened by the danger; (5) the social status with respect to the chances of receiving aid, relief, and preferential treatment; (6) the amount of prior training in relevant protective strategies and tactics dealing with the danger situation; and (7) personality characteristics, such as strength of dependency needs and chronic levels of anxiety with respect to body integrity.

There have been a number of other attempts to develop models of stress (Bharucha-Reid and Rodabe, 1962, pp. 147–58; Caudill, 1953, pp. 194–208; Levine and Scotch, 1967, Sarbin, 1962, pp. 324–41). In general, they are all variants on the basic conceptual models we have described in this section.

II. CRITIQUE OF EXISTING MODELS

Each of the models described has made a distinctive and important contribution to existing theory and research. At the same time, each has definite limitations. The purpose of this section is to analyze the

nature of these limitations. It is important to understand that many of these shortcomings do not inhere in the models as such, they are created by the perspective we will bring to bear upon them. With only a few exceptions, these models are perfectly adequate conceptualizations of the phenomena they are intended to interpret. Limitations are created when the task switches from the analysis of stress at one level of human functioning to a broader and more integrated view of stress phenomena. Indeed, the task of seeking higher orders of abstraction than now exist is only possible because of the enormous amount of useful research that has been produced by these various models. Our critical discussion of their limitations should not, therefore, be construed to mean that we regard them as unimportant or useless, on the contrary, such a discussion is the logical and desirable outgrowth of the pioneering efforts that have preceded it.

One of the major factors that inhibits the conceptual integration of existing knowledge about stress is that the concept itself is defined differently in different conceptual models. Five different referents of the stress concept can be found in the models we have cited. Mechanic defines stress in terms of responses that individuals have to situations; Basowitz and his associates, and to some degree Janis, define it as a quality of a situation that is independent of the reaction of individuals to it; Selye, Dohrenwend, and several proponents of the mechanical model define stress as an intervening state which is the internal reaction to stressors, loads, or noxious stimuli, Dunbar's version of the psychosomatic model defines stress as an attribute of the stimuli, Alexander's psychosomatic model, and Wolff's model of the Protective Reaction Pattern, define stress both as a quality of the stimulus as well as the individual's response to it. The fact that there are so many different referents to the concept of stress makes it very difficult, and on occasion even impossible to meaningfully interpret and integrate research findings generated by these differing conceptions of the phenomena.

A second limitation of these models is that they are field-specific. By this we mean that they can only be applied to one, or at the most two of the several environmental fields to which the human organism simultaneously adapts. This limitation is a serious one for the reason that studies of stress have shown it to be a phenomenon that largely transcends the arbitrary levels of analysis designated by the terms biochemical, physiological, psychological, and sociocultural. Stress manifests itself in all of the environmental fields to which the organism simultaneously adapts. Traumatic psychological stimuli often

produce basic changes in the organism's physiological and biochemical functions; social crises have been shown to affect the individual both as a psychological and as a biochemical organism. A major characteristic of an integrative model of stress must therefore be its ability to conceptualize stress phenomena at all levels of organism functioning without unduly distorting the specific phenomena of any given level. An analysis of the models we have described will show that none of them effectively accomplishes this important task. It would be difficult, for example, to apply Selye's model to Mechanic's data without seriously altering the meaning of his study Mechanic's model, in turn, cannot be applied to the data Wolff has obtained from his study of the Protective Reaction Pattern without major modifications on the model itself. Wolff's framework, in turn, cannot be applied easily to the data obtained by Basowitz, Janis, and Grinker and Spiegel. By and large, the models we have described are tailored to phenomena of a biochemical, or a physiological, or a psychological, or a sociological nature, but not for combinations of these things. Perhaps the most successful effort in this regard is Dohrenwend's adaptation of the Selye model, and its application to the study of stress in the social environment. The success of this effort lies in the fact that Dohrenwend's model can be applied both to the biochemical and the social psychological levels of analysis without unduly distorting the phenomena of either level.

A third limitation of most stress models is that they deal exclusively with events of an extreme and highly traumatic nature, although the framework Janis has proposed, for example, applies to the study of natural disasters or personal crises. Both the psychosomatic model and the model of the Protective Reaction Pattern are efforts to conceptualize psychological and physiological responses of the organism to dramatic and noxious stimuli. The Basowitz model applies only to situations a majority of persons are likely to find threatening, and therefore anxiety-producing. Selye's model deals almost entirely with traumatic stimuli, although it does have the merit of taking into account certain less noxious stimuli as well. In short, the concept of stress has been too closely equated with extreme trauma and duress. This association has had the effect of diverting attention away from the study of stimuli that are wearing to the organism, and that have important physiological and psychological consequences for it, but which are neither dramatic nor especially unusual. The relevance of such stimuli for the study of stress is suggested by the findings of an investigation by Scott of patterns of illness in a group of female employees in a large com-

mercial enterprise (1963). The study revealed that traumatic events such as the sudden death of a family member or friend, a recent divorce, or similar personal crises often produced acute illnesses. It was also clear, however, that such events were comparatively rare, and therefore of little value in helping to explain the very large amount of illness that routinely occurred on a day-to-day basis. An analysis of the data revealed that the life style of the individual, and especially the quality of her social role relationships with others, was much more determinative of the amount and severity of illness she suffered than the occasional traumatic situations that arose. In effect, both traumatic and nontraumatic but wearing events are stressful in the sense that they both produce the same types of physiological and psychological responses. With two notable exceptions, this fact is ignored in existing models of stress. These exceptions are the models by Mechanic and Dohrenwend. The basic problem with both models is, however, that they go too far in the other direction. Mechanic uses the concept of stress both to refer to the initial responses of persons to challenging situations and to their reactions to the failure to meet these challenges in any effective way By this definition the concept of stress loses much of its meaning, since almost all situations or stimuli to which individuals respond could be considered stressful. In the Dohrenwend model, stress is described as a state of the organism which results from the interaction between any antecedent constraint and the consequent efforts to reduce it. Here again, the definition encompasses virtually all stimuli to which the organism may be subjected.

Fourth, most of these models are incomplete. By this we mean that they do not take into account all of the relevant variables that produce stress. If we consider the phenomena of stress in terms of the complex of factors explicitly suggested or implied in all of the stress models taken in total, then the incompleteness of each particular model becomes apparent. Each model omits certain factors relating both to the external environment and to the organism that have been shown by the models to be important determinants of whether or not a given stimulus, event, or situation does or does not result in stress. This point can be illustrated by an analysis of Mechanic's model. We have chosen it because it is among the most comprehensive and clearly formulated of all of the available models. Mechanic describes four factors he believes determine whether or not a situation, event, or happening will be stressful to individuals. The model ignores, however, such important factors as the manner in which problems are formulated, the manner in which they are perceived by the

individual, and how the individual deploys resources in order to solve the problems.

It is important to recognize that incompleteness is an attribute of most stress models even when we evaluate them from the perspective of the level of functioning to which they are intended to apply. Basowitz, for example, does not consider such factors as perception, personal experience, or general and specific resources that the individual may have at his command to use in dealing with problem situations. His model deals only with what are regarded as the likely effects upon individuals of situations obviously traumatic in character It is not to be expected that all of the factors that produce stress will be taken into account in all studies. It is important, however, that these factors be explicitly recognized in the conceptual models upon which empirical studies are based. The fact that this is not the case is a major limitation of the stress models we have described.

Fifth, some stress models contain assumptions that are unjustified. The Basowitz model, to cite one, contains the implicit assumption that what is stressful for one person must necessarily be stressful for another This same assumption is made by Janis, whose model does not explicitly provide for the possibility that persons in crisis situations may respond in a fashion that does not reduce their mental and intellectual efficiency. Others, such as the psychosomatic model and Wolff's formulation, contain the assumption that any stimuli perceived by the individual to be stressful will necessarily produce physiological and psychological consequences of a detrimental character Mechanic and Dohrenwend are admirable exceptions in this regard, since both of them are careful to avoid making unnecessary and unwarranted assumptions.

Finally, it should be noted that a number of these models do not entirely explain the phenomena they purport to account for This is especially true of Wolff's Protective Reaction Pattern model. Research based upon his model has produced a variety of physiological responses to stress. Examples are changes in gastric function, mucous membrane secretion, blood chemistry, cardiac functioning, and blood flow to the brain and extremities. These reactions are explained as inappropriate physiological responses by the organism to symbolic threats. For example, when a foreign object lodges in the eye, we flush it out by tearing; when we are confronted with threatening symbolic stimuli, we may also respond physiologically by tearing, as though to symbolically wash away the perceived threat. The major problem with this model, is, of course, that it does not

explain why certain persons respond to noxious symbolic stimuli by tearing, others by intense mucous membrane secretion, others by hyperactive gastrointestinal activity, and still others with no apparent response at all. In addition to this problem, the experimental studies from which the model was derived are often tautological in design. A subject is exposed to what the experimenter defines as a traumatic event; exposure is continued until some visible physiological changes are produced. These changes are then interpreted as evidence for the operation of the Protective Reaction Pattern. If the subject does not manifest outward signs of stress, it is inferred that the stimuli are not sufficiently noxious, and so the experimenter simply intensifies them until something happens which he can measure.

In summary, we have identified six major limitations of existing models of stress. These are (1) referents for the concept of stress differ from one model to another; (2) the models are field-specific in the sense that they cannot be extended to all levels of human functioning without seriously distorting the phenomena at each level, (3) most of them fail to take into account nontraumatic but wearing events that produce psychological and physiological stress responses similar to those produced by traumatic events, (4) the models are incomplete in that they ignore critical factors that determine the nature of stress responses; (5) many of the models contain unwarranted assumptions as to the nature of traumatic stimuli and the likely responses of individuals to them, and (6) some of the models do not adequately explain the data upon which they are presumably based.

III. REQUIREMENTS OF A SATISFACTORY MODEL OF STRESS

Our discussion of these limitations leads us to consider the characteristics of an acceptable stress model. By the term "acceptable" we mean a model capable of integrating existing knowledge about stress into a single, unified framework. This framework should have the following characteristics First, the referent of stress should be clearly defined, and formulated so as to distinguish between stress and related phenomena in a way that is both conceptually clear and empirically feasible. Second, the model should be capable of interpreting phenomena in a variety of environmental fields without unduly distorting the nature of any individual field. Third, the model must be able to account for both traumatic and nontraumatic events,

while at the same time differentiating between degrees of wear and tear that may result from nontraumatic stimuli and situations. Fourth, an acceptable stress model must be capable of satisfactorily explaining the findings of all major relevant research. Fifth, it should be able to suggest new directions for research and especially research of a nonobvious nature. Finally, the model must be as complete as possible, taking into account the major factors that determine whether or not a given stimulus leads to the experience of stress. We have made an attempt to accomplish these diverse ends by formulating a comprehensive framework for the analysis of stress in the human organism. This framework relies heavily on the research and writings of the persons whose models we have discussed. In this section we present a revised formulation of the framework that we initially proposed (Howard and Scott, 1965).

The model we have developed is based upon an analysis of human functioning in problem-solving terms, and rests upon a set of complex assumptions about the character of the human organism. The most important of these assumptions is that each human organism tends to develop a characteristic level of activity and stimulation at which it most comfortably functions. The nature of this level varies tremendously among individuals: there are persons who require high and sustained levels of stimulation in order to feel comfortable and satisfied; there are others who require comparatively low levels of stimulation, and who feel most comfortable when demands made upon them are tightly dispersed around very low activity levels. Both genetic and behavioral factors determine variations in ranges of comfortable activity levels. A problem is defined as a stimulus or condition that produces demands on the human organism that require it to exceed its ordinary level of functioning, or that restrict activity levels below usual levels of functioning. This formulation suggests that a situation of boredom or of sensory deprivation are problem situations in much the same sense that crises, disasters, and acute insults to the integrity of the organism are problems.

Problems can be categorized into one of four types on the basis of the initial stimuli that introduce a threat to the organism: (1) problems posed to the organism from its internal physical environment; (2) problems posed to the organism from its external physical environment; (3) problems posed to the organism from its own psychological environment; and (4) problems posed to the organism from its sociocultural milieu.

Given the presence of a threat to the organism from one or more of its environmental fields, we can now consider the factors that deter-

mine whether or not it will master the threat. In considering these factors, it is necessary to distinguish between efforts at problem-solving and the actual resolution of a problem. We postulate five conditions that are necessary for successful problem-solving, or mastery. These conditions should be regarded as necessary but not sufficient conditions for mastery to occur.

The first condition necessary for mastery concerns the investment of energy Here we must distinguish between general energy level of an organism and its specific energy level. The former refers to the overall energy potential the organism has; the latter refers to the amount of energy it has to expend for any particular problem. The energy potential of an organism, whether it be general or specific, is a product of both constitutional and environmental factors. The nature of an organism's experience within each of its environmental fields is an important determinant of its capacity to generate sufficient energy to resolve problems, and of its ability to allocate energy to specific environmental domains. Thus a person who has not been active over a period of time is more easily exhausted than someone who has been very active. Similarly, the repetitive performance of a specific task increases the capacity of the organism to perform the task and like tasks without exhaustion.

Second, mastery requires resources the organism can apply in working through a particular problem. A resource may be considered as anything that contributes to the resolution of problem situations. Resources are basically of two types: (1) general resources, such as intelligence, an intact neuromusculature, and the like; (2) specific resources, such as specialized skills, pertinent knowledge, and relevant tools or materials.

A third factor that determines whether or not an organism can master a problem concerns the way in which the problem is formulated, or the manner in which the threat is posed. Put simply, if an organism is to solve a problem, the problem must be solvable. Some problems by their very nature preclude mastery Specifically, there are three ways in which this may be so. First, a problem may be open to possible solution, but solving it may involve demands that exceed the capacity of the organism; second, the problem may simply be without resolution; or third, the particular threat may be a part of a larger problem complex in which contradictory demands are made, and under such circumstances, the solution to one problem precludes the solution of another.

A fourth factor associated with mastery concerns the way in which the organism interprets a problem, and the corresponding "set" that

develops. There is a growing body of research literature in the field of psychology that indicates that perception of a problem situation strongly determines both the nature and the extent of the response to it, and ultimately the probability of mastery. The importance of this factor is suggested by the research of Lazarus on psychophysiological responses to traumatic stimuli (Lazarus, 1963). Lazarus was able to substantially alter and diminish physiological responses of subjects to a traumatic stimulus by providing them beforehand with a variety of defense mechanisms against which to fend themselves from the trauma to which they were exposed. This research suggests that mastery depends in part upon how the organism defines the problem with which it is confronted; and the character of the physiological and psychological set it has at the time that the problem itself is introduced.

Fifth, mastery depends upon the way in which an organism responds to a problem. Three kinds of responses can be identified: an assertive response, a divergent response, and an inert response. An assertive response is one in which the organism meets the problem directly and attempts to solve it; a divergent response is one in which the organism diverts energy and resources away from the confronting problem; and an inert response is one in which the organism simply fails to mobilize its resources or to respond actively

Mastery, then, depends upon an adequate source of energy, appropriate resources, the nature of the problem itself, the organism's "set" when the problem arises, and the manner in which the organism responds to the threat. Generally speaking, when mastery of a problem does occur, the state of the organism is superior to its state prior to the time of initial confrontation, in the sense that if the same problem arises again, the organism will be able to deal with it more efficiently than before.

Now we must consider what happens when mastery fails. To begin with, even when problems are successfully solved, a time gap exists between the initial provocation and the ultimate resolution. During the time in which the problem is being dealt with, the organism is in a state of greater or lesser mobilization, a state in which energy and resources are bound up so that the organism experiences tension. In cases of successful problem-solving, tensions are eventually dissipated and the organism returns to its usual level of functioning. When problems are not solved, however, tensions persist until mechanisms are found to cope with them. The failure to master threats therefore gives rise to a second-order problem; namely, that of dealing with unresolved tensions. In effect, failure in

mastery requires the organism to use an excess of energy and resources in maintenance activities over what would have been required had mastery been achieved, and the necessity of excessive maintenance activity involves the organism in a state of continuous mobilization or tension. To the extent that excess maintenance tension exists, the organism can be said to be experiencing stress. In effect, stress is regarded as a state that results from the excess tensions produced by a failure of the organism to master threats from one or more of its environment.

Finally, there are two basic courses that can be taken by organisms experiencing undissipated tension. On the one hand, it may be necessary for the organism simply to live with the tension, as in the case of assaults to its physical integrity. This is ordinarily not feasible for long periods of time if the commitment of energy or resources committed to mobilization is great, because of the fact that it will ultimately cause the organism to become totally exhausted. Second, it may be possible to temporarily dissipate some of the accumulated tensions through a variety of physical, psychological, and social mechanisms of tension release.

IV A RUBRIC FOR OTHER MODELS OF STRESS

It is not yet possible to judge the utility of the problem-solving model in terms of all of the relevant criteria identified in Section III of this paper A substantial amount of research on stress needs to be formulated in terms of this model before it will be possible to evaluate its predictive power, the extent to which it avoids distortions of the diverse phenomena it seeks to explain, its completeness, and the new directions of research it suggests. In this sense the utility of the problem-solving framework cannot be immediately determined. It is possible, however, to evaluate the model in terms of the degree to which it adequately interprets the major models and research studies we have discussed. In this final section an effort will be made to reinterpret each of the eight principal stress models in terms of the conceptual framework we have proposed.

Mechanic describes situations that are capable of evoking discomforting responses in individuals. Such situations are, in our terminology, problem situations, since they constitute threats to the organism's integrity His four factors that determine whether or not a situation, event, or happening produces discomforting responses are. in our terms, resources. It should be noted that the problem-solving

model provides not only for the recognition of resources in the quest of mastery, but also the deployment of energy, the nature of the stimuli or problem situations, and the character of the organism's response to the provocation. Mechanic's concept of reversibility is analogous to the concept of mastery, or successful problem-solving. His concept of coping behavior is the equivalent of our concept of an assertive response aimed at the direct solution of a problem. Defense is synonymous with behavior aimed at solving the secondary problems that arise as a result of failure to master a provoking situation. Finally, Mechanic's definition of stress has two referents in our system. He uses the term to refer both to initial responses to provocative stimuli, and to subsequent discomfort from the failure to master them. Our definition of tension is equivalent to the first sense in which he uses the stress concept, while his second usage corresponds with our use of the term.

A fundamental notion contained in the Basowitz model is that of a continuum along which stimuli and situations fall. This continuum may be interpreted in two ways within the problem-solving framework. First, it expresses the probability that a given stimulus will or will not require resolution by a specific number of people in a specified situation. Certain stimuli, by virtue of their unique meaning to particular individuals, may pose problems only to them; other stimuli, by virtue of their commonly shared meaning, are likely to pose problems to a large number of persons. If we confine ourselves to the terminology that Basowitz suggests, however, it is only possible to deal with the stress evoked by symbolic stimuli. Alternatively, when viewed in a problem-solving framework these notions can be extended to other areas of functioning as well. In the physiological sphere, for example, only a few people in a given group may find the presence of dust or pollen to be a condition requiring resolution, whereas an epidemic of flu constitutes a problem for many more persons, and an outbreak of typhoid in an unimmunized population is a problem for a still wider range of people. A second interpretation of the Basowitz continuum focuses on the reversibility of problems. Stimuli may pose problems to a wide range of people, but there may be an equally wide distribution of knowledge, skills, and tools for solving them, while in other cases the stimuli may be such as to preclude resolution because of a lack of available means, or because the problems they pose are unsolvable. In the former instance the probability that stress will occur is minimal, whereas in the latter case it is quite high.

A second concept Basowitz employs is that of anxiety. In the

problem-solving model, anxiety may be considered as the response of an organism to a circumstance that threatens its sense of mastery It may be specific, in response to a particular situation, or generalized (free-floating), in response to an overall feeling of inadequacy. Such a response is to be expected when an individual is confronted with an unsolvable problem, or set of problems, or when he lacks confidence in the resources available.

The psychosomatic model can also be interpreted within the present framework without serious distortion to its meaning. In our terms, when a problem remains unsolved, for whatever reason (i.e., when mastery is not achieved), then the organism can be expected to experience tension in the form of continued mobilization. This gives rise to the second-order problem we have described, that of dissipating tension. Tension may be discharged in a variety of ways, in any of the environmental areas. Increased organic activity is one form that is likely to occur when various other possibilities within the symbolic environment are inadequate, or have been blocked. If we conceive of the organism as a whole system, however, the psychosomatic model can be expanded. By considering tension as a result of overmobilization, we can assert the plausibility of the reverse environment being discharged through symbolic channels. Here, too, then, the generality of a useful model is enhanced by translating it into problem-solving terms.

The Protective Reaction Pattern model corresponds in our framework to the process of mobilizing resources. What Wolff has pointed out is that while certain types of resources are effective for solving certain kinds of problems, the mobilization of these same resources are irrelevant (i.e., divergent responses) when the organism faces other kinds of problems. They have effectively demonstrated that the human organism characteristically overmobilizes its physical resources when confronted with problems originating in the symbolic environments, and that to the extent that these problems remain unsolved, a state of inappropriate mobilization is perpetuated, or in other cases recurs when the problem is brought to the awareness of an individual.

The apparent conflict between this and the psychosomatic model is easily resolved when put in these terms. Wolff's model focuses upon the response pattern to an unsolvable problem, and particularly the relationship of resources to the nature of the problem; the psychosomatic model focuses upon the failure in mastery itself and the resultant problem of dissipating tension. Both models are in fact consistent with our postulations, and the degree to which one would

seem to fit particular data better than the other can be formulated in empirical rather than theoretical terms.

The three stages of the General Adaptation Syndrome that Selye has described—that of the alarm reaction, resistance, and exhaustion—can be related to the problem-solving model in the following way The stage of alarm reaction corresponds in our model to the organism's mobilization of its general resources in response to a problem situation and of developing a "set." The stage of resistance corresponds to the mobilization of specific resources in response to the secondary problem of tension when the initial problem is unsolved. The stage of exhaustion corresponds to the depletion of energy and resources resulting from increased maintenance needs. When put in these terms, the applicability of the Selye model to behavioral as well as physiological phenomena is facilitated.

There are three key factors in the Janis model· the various phases of the disaster situation, the response to danger; and the determinants of these responses. In our terminology, disaster situations are unsolvable problems in the sense that there is little or nothing the individual can do to prevent their occurrence. Given that fact, the response that Janis proposes are of two types: divergent and inert. The responses he terms apprehensive avoidance and aggressive irritability are, in our terminology, divergent responses, those of stunned immobility, apathy and depression, and docile dependency we would term inert responses. The numerous situational and predispositional determinants he cites are, in our terms, tension-relieving mechanisms. They are devices by which to temporarily dissipate the tensions that accumulate from the continuous mobilization resulting from unsolvable personal crises or disasters.

Dohrenwend's adaptation of Selye's model is, like Selye's model, easily understood in problem-solving terms. As we saw, the basic sequence of stress responses as Selye has described them are readily understood in terms of our model. Dohrenwend's model consists of the additional concepts of internal and external constraints, and internal and external controls. The former describe characteristics of the problem situation, while the latter describe characteristics of the resources which persons have available for solving the problem. Dohrenwend's use of the concept of stress corresponds to our concept of tension; his concept of successful adaptation is similar to our concept of mastery; and his notion of maladaptation is akin to our concept of stress.

Finally, the mechanical model of stress can also be translated into problem-solving terms. The notion of the external load describes selected aspects of the problem situations, the concept of pressure is

a general term that describes the tension of an organism generated by its efforts to solve problems, and the concept of strain is roughly similar to our concept of stress.

As empirical research continues, new stress models will undoubtedly emerge. Concepts will become more closely tied to operational procedures and we will be able to advance beyond the more or less heuristic frameworks that have been presented in this chapter. This must be an ever-present goal if we are to develop something worthy of being called "a theory of stress."

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