

CHAPTER 1

Introduction and Purpose of the Book

Thomas Kuhn (1970) demonstrated that, from time to time, paradigm shifts occur in science and society—that is, a fundamental assumption about the nature of the world changes. The ascendance of the germ theory of disease represents one paradigm shift, relativity theory another. I believe we are currently undergoing another paradigm shift—from causal reductionism to transactionism. Simply put, in causal reductionism the occurrence of an event is reduced to its underlying cause, whereas in transactionism the occurrence of an event is understood to arise from the mutual influence of a number of factors. This paradigm shift has profound implications not only for research and clinical practice but also for the fabric of society and how we conduct our everyday lives.

Clearly there is still tension between the old reductionist paradigm and the new transactional one. This is perhaps most apparent in the explosive growth in genomic science during the past two decades. On the one hand, the immense amount of information generated by the Human Genome Project, which allows us to understand more precisely the mechanisms underlying a variety of complex phenomena, can be seen as strengthening the reductionist model. But the sheer mass of information has also given rise to a systems biology approach that seeks to integrate this mountain of information by using mathematics and statistics (Pennisi, 2003). Using this technique, biologists are investigating complex topics

like cell signaling, the development of limbs in fetuses, and how yeast adapt to changes in nutritional environments.

This shift is occurring in many different branches of science. It is most noticeable in studies on the relations between the mind and body and those between the person and the environment, but other disciplines, including biology and subatomic physics, are also shifting to a transactionist paradigm. I will argue in this book that research into the psychological and physical effects of stress, and how they are modulated by coping efforts, has been instrumental in effecting this paradigm shift in the psychosocial and biomedical sciences. A primary focus of this book will be on bringing together literature from a variety of fields that examines transactions, both between the mind and body and between the person and the environment, within the context of stress, coping, and adaptation research.

MIND–BODY TRANSACTIONS

During the 17th century René Descartes proposed a fundamental dualism between mind and body. The mind was held to engage in abstract thought and language, which was separate and distinct from the operations of the body (Eccles & Robinson, 1984). This Cartesian dualism has been a cornerstone of the reductionist paradigm underlying the biomedical sciences. It assigned the study of the physiological workings of the body to science and consideration of the mind and soul to philosophy. It was further assumed that, being distinct, the mind and the body were influenced by completely different factors and that little communication occurred between the two.

Cartesian dualism was expressed in the disease model of illness, or the basic biomedical model (Virchow, 1863). This model, prevalent for the past 150 years, has held that illness results from external agents that disrupt the body's normal functions, such as bacterial and viral agents, toxins, and carcinogens of various kinds. Research focused on the mechanisms by which external agents damaged health and on how that damage could best be repaired. This model was later expanded to include disruptions caused by internal agents, that is, faulty genes.

A corollary assumption underlying the reductionist model has been that of unidirectional causality—that is, $a \rightarrow b \rightarrow c$. In biomedical terms, this means that illness is caused by exposure to an agent a that disrupts the biochemical functioning of system b that in turn leads to symptoms c . These symptoms can only be abated by restoring the functioning of system b , either by eliminating the offending agent from the body (e.g., through antibiotics) or by restoring the biochemical balance. This as-

sumption about causality focused research on the basic biochemical constitution of the body, and the amount learned has been tremendous. In Kuhn's (1970) terms, this paradigm has been extremely successful in advancing knowledge.

But any assumption holds within itself the seeds of its own limitations. As more and more was learned about physiology and biochemistry, the complexity of that information vastly increased. It became readily apparent that a simple causal model was inadequate to describe many phenomena (von Bertalanffy, 1969). Because physiological regulation of different systems involves a highly complex series of feedback loops among multiple variables, more and more conditions and limitations were placed upon simple causal models. Although invading germs or bacteria may create a *necessary* condition for a particular illness, they may not be *sufficient* to create the illness (rather, disease results from a highly complex interaction between host systems and disease agents).

For example, it can readily be demonstrated that tuberculosis results when a person is infected with tuberculin bacteria, which causes inflammation and consequent scarring of organs, especially the lungs. Characteristic symptoms include fatigue and coughing up blood and sputum. Eventually death occurs as more and more of the target organs become damaged. These symptoms can be alleviated by a course of antibiotics, proper nutrition, rest, and, if necessary, surgery to remove the damaged parts of affected organs. However, epidemiological studies of tuberculosis and other illnesses demonstrated that many more people had been exposed to or actually carried the bacterial or viral agents than came down with the disease, and the disease model had to be expanded to include the concept of *host resistance*—that everyone was not equally affected by an invading agent. Investigation of host resistance to this and many other diseases resulted in the discovery of the immune system, the enormously complex system by which the body can destroy invading agents, isolate and break down toxins, and help repair damage to organs. In many instances, disease symptoms actually represent the body's attempt to repel the invading agents rather than any active damage by the agent.

Thus, simple causal models of illness are of necessity coming to be replaced by highly complex models demonstrating interaction among multiple agents. As Kuhn (1970) pointed out, the more conditions and limitations that are placed upon a model, the more unwieldy it becomes and the more likely it is to be replaced via a paradigm shift.

But this heightened understanding of the complexity of interactions leading to disease states was not sufficient to effect the paradigm shift from physiological reductionism to mind–body transactionism. One can study any organ system in finer and finer detail without having to aban-

don Virchow's (1863) model. It is only when one begins to study interactions *across* levels of analysis that reductionism breaks down.

In other words, simple causal mechanisms assumed closed systems, to use von Bertalanffy's (1969) terms. That is, there is a circumscribed number of variables that are internally interacting and are relatively immune to outside forces. For example, classical textbook descriptions of the circulatory system detail its components, such as the heart, veins and arteries, capillaries and arterioles, and its regulators, such as the sympathetic and parasympathetic branches of the autonomic nervous system (ANS). But, as one begins to study the circulatory system and how it becomes diseased in greater detail, it becomes readily apparent that the circulatory system is not a closed system but an open one—consisting of a large number of components that are influenced by external forces. The circulatory system interacts not just with the ANS but also with the central nervous system (CNS) via the neuroendocrine system and the immune system. It is also influenced by an individual's behavior—what he or she eats, smokes, and drinks, as well as whether or not and how he or she exercises. Other influences include the level of stress in an individual's life and his or her personality, cognitive style, and social relations.

Thus, the tools provided by the medical model and physiological reductionism that allowed us to understand in greater and greater detail the workings of the body also uncovered the limitations of that paradigm. No organ system is a completely closed system. Rather, all are subject to regulation by the brain via the neuroendocrine and immune systems (Ornstein & Thompson, 1984).

The psychological sciences imitated the biomedical ones in expressing Cartesian dualism as unidirectional physiological reductionism—that is, psychological processes could be reduced to their neurophysiological bases. In the most extreme statement of this point of view, the mind was viewed as an “epiphenomenon” of the brain. While many more complex models do exist in modern psychiatric theories of mental illness, the dominant tendency is still to ascribe causality to biochemical mechanisms. For example, if one finds that depressives who commit suicide have much lower levels of serotonin than nonsuicides, the standard assumption is to ascribe the suicidal behavior to that neurotransmitter imbalance and to treat depressive disorders by restoring the neurotransmitter balance through drugs. However, equally plausible alternative explanations include the possibility that the suicidal ideation creates the serotonin imbalance or that there are mutually reinforcing feedback loops between the two. Certainly, the fact that cognitive-behavioral therapy is as good or better than antidepressants in alleviating depression (Gloaguen, Cottraux, Cucherat, & Blackburn, 1998) indicates that depression involves complex interactions between physiology and experi-

ence. This is highlighted by a recent study by Caspi and his colleagues (2003), which demonstrated that depression results from interactions between alternative forms of the gene that regulates serotonin uptake and exposure to stressful life events.

Elegant arguments that the mind is not solely reducible to the brain have been proposed by Eccles and Robinson (1984), based upon the neuropsychology and linguistics literature, and by Walker (1970), based upon physics. Although Popper and Eccles (1977) proposed the term “dualist–interactionism” to describe the relationship between the mind and the brain, the construct of transactionism may be more appropriate in describing this relationship. According to transactionists such as Lazarus (1966; Lazarus & Folkman, 1984) and Appley and Turnbull (1986), dualist–interactionist models are incomplete because they imply that two agents are mutually creating a phenomenon but nonetheless remain independent and unchanged. Transactionism, on the other hand, assumes that the two agents are not independent but are mutually affected by the transaction.

Figure 1.1 illustrates the difference between physiological reductionism, interactionism, and transactionism, using emotions as the dependent or caused phenomenon. In the top section, the arrow indicates that the brain causes the emotions. For example, serotonin is hypothesized in older, simpler models to cause negative emotions. The middle part of the figure illustrates interactionism: that the brain and the mind (cognition) both affect emotions. Using stress terminology, one would say that the appraisal of a threat, combined with a genetic propensity to overproduce adrenaline, would result in excessive feelings of anxiety. In

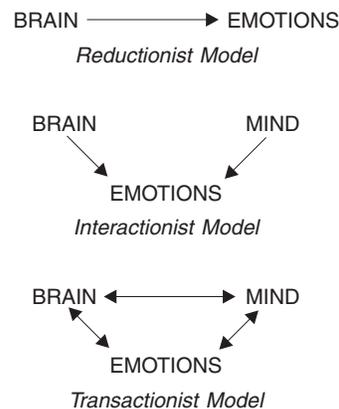


FIGURE 1.1. Comparison of different causal models of emotions.

transactionism, the dependent variable (in this case, emotions) in turn influences both the brain and the mind. Thus, through the medium of emotions, the brain and the mind *mutually affect one another*.

From a transactionist viewpoint, the mind is no longer reducible simply to the workings of the brain, nor, as a colleague of mine once whimsically put it, is the brain a mere epiphenomenon of the mind. Rather, the state of mind influences the workings of the body, while the state of the body influences cognitive and emotional processes. Both can be changed as a result of the transaction. For example, continuing anxiety may affect both physiological functioning and appraisal processes.

Psychiatric understanding of depression is gradually shifting from a simple neurochemical imbalance model to one that is refocusing on the structure of the brain. One of the most exciting areas of research involves the interrelationships among stress, hippocampal size and functioning, and depression. Traumatic or chronic stress may result in high levels of stress hormones such as cortisol, which differentially damage the hippocampus (Sapolsky, 1999). In turn, hippocampal size has been correlated with depression (Do, Payne, Levy, MacFall, & Steffens, 2002). Current thinking is that some antidepressants work not by changing biochemical imbalance but by stimulating the growth of new neurons in the hippocampus (Manji et al., 2003). The role of coping in this system has yet to be investigated, but clearly that is an important link in this system.

Sperry (1993) suggested that this cognitive revolution in psychology has formed the basis for the current paradigm shift in the sciences in general. The seemingly simple addition of bidirectional arrows has enormous implications, not only for the manner in which science is conducted but also for much of everyday life. The body is no longer a mechanical device that sometimes requires repair. The emphasis has been slowly shifting to a disease prevention model, especially given the prevalence of chronic disease among a rapidly aging population. People are now much more aware of the impact of psychological stress on their bodies and may try to reduce that influence through myriad methods. In California, claims for stress-related disability or workmen's compensation have increased dramatically during the past two decades. On the other side of the equation, millions of Americans now avidly pursue physical fitness as a way of helping to manage their psychological states. In short, the fabric of our lives has changed tremendously as a direct result of this paradigm shift.

A transactionist paradigm has greater implications also for the study of adaptation, implications that have not yet been fully understood within psychology. In any scientific endeavor it is extremely important to examine one's assumptions, understand their implications for

how the world is thought to function, and formalize hypotheses. Studies of stress and coping form a laboratory, as it were, for examining the role of transactional processes in adaptation. Thus, an additional purpose of this book is to explore the implications of a transactionist paradigm for stress, coping, and development.

Two assumptions of transactionism are particularly relevant to stress and coping research. First, variables mutually influence each other, both within and across levels. If the mind and brain do transact, then, being regulated by the brain, organ systems are subject to influence by the mind and, in turn, anything that affects the mind (e.g., society and culture). Thus, seemingly distinct levels of analysis—sociocultural, psychological, and biological—are all linked. Further, how a culture or society is structured has implications for an individual's physiological well-being, not only through the direct allocation of resources (Pearlin, 1989) but also through influencing characteristic psychological states and stress levels (Colby, 1987).

Second, transactionist models of necessity imply developmental processes in that the focus of any transaction is change. Thus, a paradigm shift in developmental sciences involves dynamic systems theory—positing that there are mutually influential changes over time (e.g., Ford & Lerner, 1992). Most stress theorists focus on the immediate situation and try to show, for example, how appraisal affects coping, which in turn affects both the outcome and appraisal processes. However, a transactionist model implies a strong possibility that both the mind and the body are altered as a result of their transaction. Theorists such as Schonpflug (1985) and Hobfoll (2002) have implied this in their economic models of stress and coping as resource depletion–conservation. However, there is no reason to assume that a stress transaction has exclusively negative outcomes but rather may have positive ones as well, as is implied by Meichenbaum's (Meichenbaum & Cameron, 1983) stress inoculation theory and Dienstbier's (1989) construct of stress-induced "toughness." Aldwin and Stokols (1988) have presented various approaches to modeling change, whether positive or negative, short-term or long-term, that can result from stressful interactions. Indeed, the whole area of "posttraumatic growth" is one of the most exciting new areas in psychology (see Tedeschi & Calhoun, 2004).

PERSON–ENVIRONMENT TRANSACTIONS

Thus, transactionism has broad implications for the study of stress and coping in that it can link both environmental (e.g., sociocultural) and developmental perspectives to biomedical findings. Figure 1.2 presents the

view of coping as seen from the reductionist, interactionist, and transactionist perspectives. The top part of Figure 1.2 represents the reductionist, or stimulus-response (S-R), model of coping behavior. In this model, coping behaviors are viewed as simple responses to stressful environmental stimuli. The middle part of Figure 1.2 represents the interactionist model. Coping is hypothesized to be a function of personal and environmental characteristics. For example, the use of coping strategies is influenced by personality characteristics, such as emotionality (Bolger, 1990), as well as by the type of stressor or environmental demand (Mattlin, Wethington, & Kessler, 1990).

The standard transactionist point of view (see, e.g., Lazarus & Folkman, 1984) examines transactions only within the context of a single stressful episode. In this model, personal and environmental variables influence appraisal, which determines the type of coping response. Coping outcomes, in turn, influence the appraisal process. Yet, inspection of the bottom part of Figure 1.2 suggests that coping outcomes not only influence appraisal processes within the stress context but also may have effects on both the person and the environment. For example, how a person copes with a particular stressful situation may add to his or her coping repertoire or may alter a person's outlook on the controllability or uncontrollability of the environment (e.g., locus of control or explanatory style). Further, how an individual copes with a problem may alter the environment, affecting not only whether a particular problem is solved but also whether and how the problem arises for other individuals. Legal action to resolve racial or sex discrimination cases, for example, may provide the means for other individuals to cope with similar

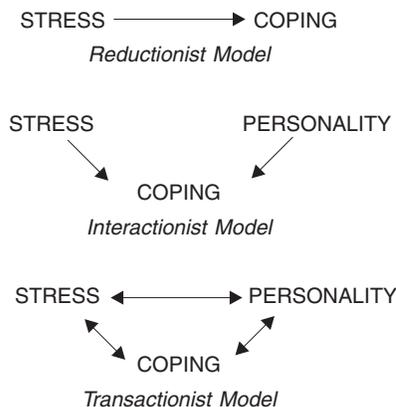


FIGURE 1.2. Comparison of different causal models of coping.

problems. Thus, the implications of a transactionist viewpoint extend beyond the individual stressful context to wider developmental or social situations.

In stress and coping research, the environment has been viewed primarily in interactionist terms, that is, as a stimulus or source of stress, or less frequently as a source of resources for coping with stress (e.g., social support). However, a transactionist view suggests that the environment has a much more extensive role than simply its function as a stimulus or a resource. For examples, physical and social environments play a role in shaping not only the choice of coping strategies (de Ridder, 1997; Mechanic, 1978; Thoits, 1986) but also the impact of that strategy (Zautra & Manne, 1992). Further, in most theories, coping is assumed to have some effect on the problem, but studies generally focus only on its effect on the individual's well-being. From a transactionist point of view, more attention needs to be paid to the effect of coping on the environment, whether its effect on the immediate problem or on others in the situation (DeLongis, Bolger, Kessler, & Wethington, 1989). If, as Mechanic (1978) so radically suggested, coping strategies are primarily a function of cultural patterns and institutions, then how an individual copes not only has an effect on the immediate problem but also adds to the cultural repertoire of coping strategies (Aldwin, 1985).

ORGANIZATION OF THE BOOK

This book explores the themes presented in this introduction from the perspective of the paradigm shift in the psychological and biomedical sciences. However, any paradigm shift is accompanied by much dissension and argument as various opposing factions argue for the status quo or for different directions of change. This dissension is obvious in the area of stress and coping. Rather than attempt to promote any one particular school or theory of stress and coping, we will take an "elephant in the dark" stance. That is, no one school or theory is complete and correct—the differing approaches all have strengths and limitations, and in some circumstances the approaches are not so much in conflict but are actually addressing quite disparate parts of the "elephant." By examining the historical context and conceptual assumptions underlying different approaches, we will attempt to clarify the nature of some of the debates in the field and to show precisely where the conflict lies and how the differing approaches might be integrated, where possible.

It is also true that research methods have lagged far behind the theoretical conceptualization, especially in psychology. Thus, key methodological issues of relevance to both the conduct of research and its inter-

pretation will also be considered. Again, rather than advocate any particular technique, we will discuss the strengths and weaknesses of the various ways in which stress and coping are measured and which techniques may be useful for differing research questions and contexts.

As with any scientific discipline, the field of psychology has gone down many blind alleys, in part because psychologists have made simplified assumptions for the sake of constructing theoretical models, but also in part because they have allowed their research—and to a certain extent their clinical work—to become divorced from the realities of everyday life. In many ways, this divorce has been useful—the best of psychological research has often shown that “conventional wisdom” is markedly and decidedly wrong. But this divorce can also be responsible for pursuing assumptions down blind alleys, as when Watson tried to reduce thought to microscopic workings of the musculoskeletal system underlying speech or when Hull tried to reduce memory to muscle action. Thus, putting psychology into its everyday context is important not only as a check against wrong assumptions but also is a didactic tool, a bridge for students to connect their own experiences to psychological theory.

These three concerns with theory, method, and relevance influence the structure of this book. Chapter 2 discusses conceptual issues in stress research and why the construct of stress and how it is researched are important to our everyday lives. Chapter 3 discusses the different definitions of stress and how the assumptions implicit in these definitions influence the type of research that is conducted. Our knowledge of the impact of stress on physiology has been greatly enhanced during the past decade, and this update will reflect that increased sophistication by devoting a new chapter (Chapter 4) to that topic. Chapter 5 addresses issues in stress measurement and methodology, and pays special attention to new techniques for assessing daily stress processes as well as ecological momentary assessments.

While the stress literature has been reviewed extensively, there have been surprisingly few exhaustive reviews of the coping literature (but see Aldwin & Yancura, 2004; Folkman & Moskowitz, 2004); the subsequent chapters attempt to fill that gap. Initially paralleling the construction of the chapters on stress research, Chapter 6 addresses conceptual issues in coping research; Chapter 7, definitions of coping; and Chapter 8, the measurement of coping strategies. Issues in stability and change in the factor structure of coping will be reviewed. Appendix 8.1 also includes a partial nonannotated bibliography of coping measures that should prove useful to both researchers and students. Chapter 9 discusses some of the methodological and statistical issues in understanding

the effects of coping. The statistics and design section is enhanced by including newer structural equation, hierarchical, and longitudinal models.

Chapter 10 reviews the literature on coping and mental health outcomes, and Chapter 11 addresses coping and physical health outcomes. Our understanding of the neuroendocrine and immune systems has exploded during the past decade, and, as we shall see, the coping and health outcomes literature has been struggling to keep up. Chapter 12 examines how individuals cope with trauma and includes a new section on coping with the aftermath of the 9/11 terrorist attacks.

A major limitation of stress research is that it has been almost strictly a psychological endeavor. However, there is a growing recognition that social and cultural contexts affect stress and coping processes. Chapter 13 reviews the small but growing body of research that demonstrates the interpersonal and social influences on appraisal and coping processes and that shows how work in medical anthropology might radically alter our view of how coping works.

This book also places the study of stress and coping in a larger developmental context. In part, this is accomplished in Chapter 14 by reviewing the coping literature in special populations—children and the elderly—as well as providing theoretical overviews of changes in coping across the lifespan. Thus Chapter 15 reviews studies on stress-related growth. In our rush to document the negative aspects of stress, we may have overlooked its positive aspects—stress as an impetus for growth and development, and transformational coping as the manifestation of a lifelong quest for greater mastery and understanding. While research in this area has also greatly increased during the past 12 years, reviews of that literature are also scarce, and the revisions to this chapter will address that gap.

Chapter 16 provides a summary of the various themes developed in this book and how they relate to the transactionist perspective espoused in this chapter. It also examines deterministic versus nondeterministic models of adaptation. In the 13 years since this book was first published, a greater acceptance of the importance of volition in adult development and adaptation has occurred (see Brandstädter, 1999), especially in the context of positive psychology (Seligman & Csikszentmihalyi, 2000).

In summary, within the field of stress and coping, this book provides some insights into the nature of conceptual and methodological debates in the field in order to allow researchers and students to best decide which particular approaches and assessment techniques are most relevant for them. In addition, integrating developmental psychology, especially adult developmental psychology, with an understanding of the

nature of adaptation provided by stress and coping studies will enhance both fields. Adding a developmental perspective to studies of adaptation may provide an impetus to reconsidering the types of outcome measures that are used; and adding an adaptation perspective to developmental psychology may provide greater insight into the role of the environment in promoting development, in both childhood and adulthood.