Chapter One

KNOWLEDGE AS APPROXIMATION

Not long ago, one could sit in a psychology class where the professor would ring a buzzer anytime a student used the word "mind." Mind, of course, was a heresy more preferable than speaking of soul or self, but all such explanatory intervening variables, intervening presumably between observable stimuli and responses, were taboo. Anything unobservable was suspect, including such constructs as personality or motivation, wiping out in one fell swoop much of the vocabulary and questions that had drawn people to the study of psychology in the first place.

Under the reign of strict behaviorism that dominated much of the twentieth century, the legitimate domain for the study of academic psychology was external, observable behavior. Data were obtained through measurement using the five senses augmented by instruments or apparatus. Questions not capable of testing via sensory-grounded empiricism tended to be dismissed as non-meaningful. Behavioral psychologists argued that psychology needed to free itself from philosophical speculation, hypothetical constructs, and intervening variables, returning to what could be observed and seen.

Scientific laws were conceived as simply summarizing relationships between the observed data. The role of theory was to be minimized by avoiding hypotheses about "why" X and Y are related. Some "theory" would be necessary in order to form hypotheses and propositions to test experimentally, but the goal was to stay as close as possible to the data, moving from data to minimal "theory" to a prediction and gathering of new data, with no pause for global speculations or formation of concepts to explain how two events are related. Theoretical statements had the status of "ghosts" (Pirsig, 1974) haunting the "black box" or no-man's-land between stimulus and reponse, about which behaviorists did not wish to speculate.

This set of assumptions reflected the model of classical science, and argued on behalf of the existence of actual facts that could be known about reality "out there," derived in trustworthy fashion by the senses. Such a view of science was grounded through the first half of the twentieth century on the assumptions of logical positivism, which insisted on the pri-

macy of sense data as the starting point and measure of all valid knowledge. The dominance of behaviorism's demands to avoid theory and philosophical speculation led to a singular blindness toward acknowledging and examining its own philosophical underpinnings in logical positivism. And as increasing criticism became directed in philosophy toward logical positivism, psychology was effectively shielded from this debate. Thus as the second half of the twentieth century began, psychology continued to model itself on a science and philosophy of science that had long since been collapsing.

Much has happened in more recent years to challenge these positions, though it is clear to those working in the field that these issues are by no means dead. To those outside psychology, questions about the limits of objectivity and certainty, and fundamental epistemological doubts about truth-seeking and what if anything we can know for sure, became familiar issues in the discourse of postmodern language communities. It has been within this context that increasing appreciation for the relevance of metaphor to issues of epistemology and knowing has become widespread in philosophy, religion, and the humanities.

Psychology has not been immune to this debate,[1] and it is indeed a major achievement of philosophical psychology and "metapsychology" that metaphor is fast becoming an accepted topic.[2] These arguments in contemporary philosophy of science regarding the limitations of objectivity, knowledge as approximation, the importance of theory, and the necessity of metaphor are directly relevant to the task of seeking to explore a systems model of reality. To the extent that systems theory represents a departure from positivistic assumptions, and a challenge to linear behaviorism, it is valuable to understand the nature of the criticism in philosophy of science which has opened up a more serious appreciation of theory and model in the process of inquiry. Further, to the extent that this book represents a quest for a model of wholeness that can inform our perspectives and guide our practices, it must address questions of the adequacy of any model and the special relevance of metaphor in this process of inquiry.

The claim of systems theory to offer a large-scale unifying model for understanding "reality" must negotiate a path through the serious concerns that have been raised regarding the limits of knowing. At the same time, the possibilities of systems theory as an informing metaphor are enhanced by a fuller understanding of the limitations of the logical positivist and more linear behavioral models with which systems theory contrasts. Systems theory, with its metaphors of interrelatedness, seeks to do justice to the complexity and connectedness it confronts in the domains of science and psychology. By providing an interdisciplinary metaphor system that invites dialogue across the fields of psychology, science, and religion,

systems theory stirs up issues in epistemology across this range of concern. These issues need to be taken up by way of introductory overview, to allow for the full emergence of systems theory as a unifying model across domains. Such is the task of the first two chapters, the first addressing issues in knowledge as approximation and the second, the crucial role of metaphor in theory-building.

> Desiring to know the sizes of fish inhabiting a newly discovered mountain lake, enthusiasts went out to the lake with large 12-foot nets, the holes varying in size from two inches up to six. Systematically covering the lake, they dipped their nets into the water and counted and measured the fish they drew up. The official report submitted to the town council evidenced surprise that although there were an abundance of fish of varying sizes over two inches, not one fish under two inches appeared to be living in the lake.

The Limits of Objectivity

Perhaps the most powerful legacy of the twentieth century for science and philosophy has been the steadily accumulating challenge to the possibility of "objective" knowledge, uncolored by assumptions or interpretations. The core implication is that there can be no such thing as neutral fact or finding: there are no "raw" data (Grover, 1981, p. 8). All data are affected by theory, method, or interpretation. "Data" are really "capta" (Laing, 1967, p. 62), seized according to some framework rather than neutrally encountered. No scientific fact exists apart from a value decision, a choice or interpretation about what is worth studying and how this should be done.[3]

The perceptual process itself models this problem of interpretation. Even in the very act of seeing, there can be no such thing as "immaculate perception" (Laszlo, 1987, p. 109). Perception is an interpretive process in which the raw data of sensation are organized and transformed in the process of yielding a final impression. The process of sensation is already a data-filtering system which receives only that type and degree of input capable of being selected by the physiological limits of the sense receptors. Of the vast electromagnetic spectrum, we can only identify those wavelengths for which we have receptors. Abstraction or data reduction is a hallmark of the sensory act, and the process of perceptual interpretation

begins almost immediately in the first codings the received input is given on its way to the cortex.

Past experience, context, cultural expectations, and other factors create a "perceptual set," an interpretive matrix through which the sensory input is understood by the organism. The schema or categories available for assignment of incoming input depend on past experience and affect the ease and accuracy of the process of interpretation. For example, persons who watched pictures of playing cards flashed on a screen at extremely high speeds were often unable to identify accurately aberrant combinations such as a red six of spades. Instead they might see this as a black six of spades, a red six of hearts, or even a purple six of spades, if the unassignable combination did not disrupt perception altogether (Bruner & Postman, 1949). The influence of perceptual set and expectations on pain perception is even more dramatic.

Our knowledge from its onset is also embodied, embedded in our kinesthetic relationship to reality and in the connection of our bodies to the physical world (Johnson, 1987; Berman, 1989). We understand causality at least as much due to our bodily based experience of moving and interacting in the world as due to abstract intellectual understandings of the concept. The body as a context for knowing, and the sense of touch as a way of taking in information, illustrate the interactive nature of perception even more tangibly than vision, which often misleadingly encouraged for philosophers of science a sense of neutral distance between perceiver and perceived (Gill, 1982).[4]

Polanyi calls this bodily based backdrop to formal knowledge "tacit understanding." Tacit understanding consists of the assumptions, subjective values, and preverbal, peripheral awarenesses that direct our attention when we seek to understand something in a more formal, explicit, and abstract way. There would be no science without the tacit understanding that there is something to be discovered, that something of value exists to be studied. Personal participation or "indwelling" is the fundamental basis for human knowledge. Not only do our rather hazy apperceptions of the importance of a discovery witness to the role of value and choice in directing inquiry, but our very passion for truth, beauty and comprehensiveness is a critical guide to the integrity of research. Rather than an enemy of inquiry, passion becomes a clue to significance and an irrevocable part of inquiry. Involvement, not detachment, characterizes the discovery of the new.[5] The knower participates in the shape of the known. "Reality seems to be a kind of alloy between perceiver and perceived" (Maslow, 1966, p. 111).

The role of perceptual set and tacit understandings at the individual level is paralleled at the cultural level by the role of basic assumptions, presuppositions, guiding models, or paradigms which characterize an age. Remaining seductively hidden from consciousness, those presuppositions

by which we operate are often the last to be examined, just as the fish proverbially are the last to discover water. Kuhn (1970) argued that science can best be understood, not as the accumulation of individual discoveries or "facts," but as a series of revolutions or changes in its ruling "paradigms."[6] Periods of "normal science" are dominated by an acknowledged paradigm which provides direction to two basic types of questions: (1) What aspects of reality deserve attention; what questions are interesting and worth asking; what shall we study? and (2) How will we study these questions; what methods or procedures are appropriate or adequate to this task? Seen from this perspective, the scientific method is itself a set of assumptions about how to discover knowledge rather than a neutral process.

Normal science proceeds under its relevant paradigm until a persistent anomaly or exception in the data is observed and cannot be fit into the old paradigm. Although paradigms are highly resistant to change, an inconsistency found repeatedly will eventually trigger a crisis for the science and a search for a new paradigm and subsequent revolution in worldview. Shifts in paradigms usher in a new phase of normal science and assumptions again recede into the background, shaping awareness and methodology but only too often out of awareness themselves.

> Returning home from a late evening gathering, a young couple notice their neighbor stooping over the curb under the streetlight. Suspecting that he might have lost something and willing to offer assistance, they inquire. Indeed, replied the neighbor, I have lost my keys. Where exactly do you think you lost them? the couple asked. Over there by the garage, motioned the neighbor, pointing away toward his house. Then why are you looking for them here in the street? they asked with surprise. Because, my friends, the light is much better here.[7]

Although the history of psychology has not been unified under one sole paradigm, the major schools have held differing "miniparadigms" regarding the nature of what is worth studying and how this varying content should be studied. As we have seen under behaviorism, what we are to study was defined as external, observable behavior. Areas of human functioning like willing, thinking and feeling were considered irrelevant to explaining causation, at most acceptable among clinically oriented pursuits on the fringe of mainstream academic psychology and only recently relegitimized in altered form under the rubric of cognitive-behavioral psychology.

Under the same behavioral miniparadigm, how we are to study behav-

ior was answered in favor of the experiment. Naturalistic observation, case studies, and correlational data were considered inferior sources of data or new hypotheses. The emphasis on empiricism and the importance of direct observation of data became translated into a near-exclusive valuation of experimentalism as the acceptable form of empiricism. In being "method-centered" rather than "problem-centered," psychology risked committing "methodolatry" (Maslow, 1966, pp. 16, 145) or "method-fetishism" (Koch, 1981, p. 260), with methodological and statistical considerations often dictating the types of questions worth studying or even considered studiable (Bakan, 1972, 1973). Whatever did not fit with ease into the dominant methodological designs was often dismissed as overly vague and unworthy of study, with the result that the focus of study was determined by method rather than by the essential, rich complexity of the problem area itself.

The behavioral paradigm carried another important assumption that was made doubly powerful and thereby less obvious by being shared by the psychoanalytic school with which it otherwise fundamentally disagreed. The emphasis for both was on the analysis of complex behavior or experience into component parts, whether chains of stimuli, response, and reinforcement or ego, id, and superego dynamics. The first challenge to this analytic emphasis on parts came from Gestalt psychology which championed the maxim that the whole is greater than the sum of its parts. In fact the paradigm most likely to be emerging today is a holistic one, in which systems theory carries even further the Gestalt emphasis on wholeness.

As starting points for observation and thinking, assumptions play a further role in psychological research through the formation of operational definitions for what we are going to study. An operational definition in psychology is a definition or explanation of a construct or concept in terms of how you are going to measure that quality. Thus if we wish to study anxiety we must specify in observable terms if possible how we are going to measure anxiety, whether by a specific questionnaire or other more behavioral measure. There are often several alternative ways one might choose to measure a concept, depending on what assumptions one holds about the construct.

Once love is included within the realm of acceptable concepts to study, a process which has taken much of the twentieth century for example, it must be operationalized. Love might be variously defined in terms of "the amount of eye contact between two persons" or "the extent to which one person puts the interests of another above his or her own." Each choice may lead to different observations and discoveries about love. The scientific method is intrinsically bound up with choices in how one is to measure and define one's target area of study. The critical issue is not to determine which operational definitions are more true, but to stay aware

of the role each set of assumptions and definitions plays in determining specific observations and reflections upon reality.

In the realm of personality theory it has been long argued that every theory is linked and supported by a set of philosophical assumptions characteristic of the theorist in question. These assumptions may only be implicit in the theory, as in the case of Skinnerian views of human behavior which embody a certain set of philosophical assumptions despite a typically deliberate attempt to avoid theory. William James (1963) called attention to what he labeled the "tough" versus "tender-minded" philosophical or personal leanings which underlie most theoretical debates and differences of opinion in philosophy and psychology.[8] Projections, selective attention, and differences in values also have the potential to color theory. Any process of classification or categorizations provides a set of blinders, useful for purposes of extracting order and simplicity from complex phenomena, but potentially detracting from a more complete vision.

Probably the classic testimony in psychology and the social sciences to the power of assumptions and expectations has been the phenomenon of self-fulfilling prophecy (Merton, 1948) and the accompanying issue of experimenter bias (Rosenthal & Fode, 1963; Rosenthal, 1966). Demonstrated in a wealth of different experimental and naturalistic observation contexts, self-fulfilling prophecy represents the way in which our assumptions and expectations about other people or ourselves actually affect what they or we become. In research settings, expectations from experimenters can be transmitted unwittingly to participants in experiments, a concern underscoring the importance of double-blind procedures in research and other methodological precautions. Though attention is now being directed to qualifying the limits of expectancy effects and noting a greater role for accuracy in social judgment in educational settings (Jussim, 1989; Wineburg, 1987a, 1987b),[9] concern for the dangers of diagnostic categories and labeling in families, schools, hospitals, and juvenile justice systems continues to be a vital issue.[10]

Within the field of physics, an even more profound implication of the role of the observer can be found in Heisenberg's uncertainty or indeterminancy principle. This principle was derived from the finding of quantum physics that an observer cannot know both the position and the momentum of a subatomic particle with precision at any one point in time. Both position and momentum can be known approximately, but the more information is known about one, the less one can know about the other. This observer-observed dilemma reflects the problem that measurement at this level involves high speed particles fired at other particles, which affects and changes the trajectory of the particle being studied. To leave the particle alone is not to see it at all. One cannot observe without changing the

phenomenon; discovery involves interaction. This and other related findings have suggested and underscored the emphasis in modern physics on probability statements about reality rather than a claim for perfectly predictable and deterministic events at the subatomic level. In addition, the finding has stressed the impossibility of objectivity at this level, for by choosing where to focus, one "creates" a new situation where what is observed "is not nature in itself but nature exposed to our questioning" (Heisenberg, 1958, p. 58).

There is considerable debate as to the appropriateness of extending this argument derived from the subatomic level to more complex levels of reality. Great caution always needs to be exercised when extending a concept beyond the domain from which it was derived. Suffice it perhaps that this law of physics be a profound reminder from another level of reality of the danger of observational methods affecting the findings of a study, a principle already demonstrated at the psychological level of reality.[11] By remaining relatively unexposed to the principle of indeterminancy and the inevitabilities of observer influence, however, much of psychology has too often been caught in the position of trying to "outscience" science in its pursuit of unqualified objectivity.

Another major finding in modern physics has served as a reminder of the ways in which the questions we pose in science actually affect and mediate the types of answers received. This discovery has been termed the principle of complementarity and is derived largely from Bohr's formulation of a way to conceptualize the classic wave-particle debate in nuclear physics. Energy has been found to travel in discrete packets or quanta, yet a quantum appeared to have both wave properties and particle properties, depending on how the study was set up to measure the issue or how the question was posed experimentally. According to the principle of complementarity, both alternative viewpoints can be seen to hold validity depending on the point of view assumed. The principle underscores the role played by questions and assumptions in affecting the nature of what will be found in inquiry.

Again it is valid to use caution in extending such a principle from the level of quantum physics to molecular levels such as found in psychology, but the principle provides a useful example at another level and domain of a principle found independently in psychology, in particular in such issues as operational definitions. There is a growing suspicion, for example, that mind/body dualism is a problem at least partly resulting from the types of questions asked. One of the potential strengths of systems models and metaphors lies in challenging such dualisms and subject-object dichotomies that are also called in question by contemporary philosophy of science.[12]

It is not surprising that psychologists, faced with the great risks of subjectivity in a field where humans study themselves, have been concerned to make psychology as objective as possible through emphasis on experimental control, observable behavior, etc. This emphasis was a critical and valuable contribution of behaviorism. However, this desire for objectivity has often been pursued with a conviction that such a goal was in fact totally reachable, and any deviation from it was judged as suspect. It is this absolute use of the concept of objectivity that is under criticism in psychology, physics, and philosophy of science today.

Although knowledge can be seen as involving participation, embeddedness, and interaction, there is still an important role for public validation and replication in science, which is another meaning of the term objectivity that should not be lost. Even if there is no absolute guarantee of objectivity in the sense of a glass wall or one-way screen behind which psychologists can stand, without contaminating the phenomena on the other side, there can still be an attempt for publicly repeatable and shared observations; and there must be an attempt to avoid subjectivity, in the sense of private idiosyncracies, in data collection. However, it is an error to confuse this public meaning of objectivity with an insistence on only collecting externally observable or so-called "objective" data, for complex, subtle, and internal data can also be submitted to tests of replication and public validation. Data derived from personal internal experience pose greater challenges to research, as in such concepts as a state-specific science (Tart, 1975a), for example; but to neglect these sources of knowledge can be as idiosyncratic and "subjective" as the decision always to give these sources priority (Rychlak, 1968, p. 24). Thus, while absolute objectivity may be a myth in the field of inquiry, this does not mean that science is impossible or that the community of scholars cannot protect against idiosyncratic subjectivism. It must also be remembered, however, that the body of scientists themselves may share a common basis for subjectivity that remains unrecognized due to positions of majority vision.

In an experimental animal therapy program, a young trainer brings an elephant to a group of blind children. Eagerly they each approach the new experience, to be able to share their information with the others. But soon they are arguing. It is like a wall, says the one standing up against the elephant's side. It is like a rope, says the one at the tail. No, you are both wrong, it is like a pipe, shouts the one at the trunk. How silly you all are, argues the one at the ear, it is like a huge fan.

Doubt and Certainty

Even if we acknowledge the limits of objectivity, we come up against the more challenging issue of whether there really is a "reality" out there to know. In other words, if all we can know are our limited perceptions, how can we be sure there "really" is an elephant "out there"? Responses to the question of whether there is a reality to be understood external to the observer typically have been split into two competing and presumably mutually exclusive orientations. The "realistic" argument assumes the existence of an external world independent of the observer and known by the orderly, sequential, and largely passive process of building up more complex ideas from simple sensory input. The "idealistic" approach assumes that one cannot get at an understanding of reality in itself, and in its most extreme form idealism argued against the possibility of profitably and validly conceiving of a reality apart from the perception of the perceiver. In this view knowledge could only be an approximation in which the active human mind, with a priori categories and transcendent qualities of intellect, brings its own or a created structure to experience. Knowledge is thus seen in idealism as a creative act, a shaping of reality and not a mapping out of sense data.

Contemporary philosophy of science has dealt the strongest blow to realism, particularly in criticizing the "correspondence theory of truth" whereby our constructs can be said to derive from and parallel "reality" out there (Rorty, 1979). Our view of the world does not function as a mirror, the postmodern argument goes, and perspectives must be deconstructed to reveal their biases. Yet there is no absolute standpoint or center that can be appealed to in establishing priority of perspective or in evaluating bias. The legacy of Wittgenstein has been to render questions of ultimate truth beyond capability of resolution, and thus to challenge even the perspective of idealism. The growing field of "metapsychology" directs attention across the range of these philosophical controversies, including: the impossibility of objective verifiability of knowledge through empirical observation, the difficulty of grounding descriptive psychological language for human behavior and experience in objectifiable event, the dependency of meaning on sociohistorical context and construction, and implications for evaluating or differentiating theory in light of these challenges to objectivity.[13]

Much of contemporary philosophy leaves us with the dilemma of competing language communities (science, philosophy, art, history, psychology), each playing its own language "game." According to the sociology of knowledge, science and all inquiry are conducted within communities of scholars who share certain language and conceptual patterns,

norms, paradigms, and politically and economically motivated dilemmas—all of which factors influence and inform knowledge as much as the nature of the phenomenon under inquiry. Each discipline has a social history and shows an inextricable embeddedness in its communal discourse.[14] By implication, we enter an age of multicentered perspectives, none of which can claim to be seriously concerned with Truth seeking. Often the only protection from using power to adjudicate competing claims is seen to reside in maintaining a maximum of differing perspectives, so that no minority position is excluded.

Such a philosophy perches on the edge of relativism, and contributed greatly to the depreciation of metaphysics, that branch of philosophy that seeks to construct a view of ultimate reality. Both trends have been criticized. The concern to avoid the danger of "uncritical relativism" (Sampson, 1987, p. 43) is reflected, for example, in Gergen's commitment to finding a basis for theory evaluation and comparison that can replace that of "objectivity." He suggests the alternative criterion of "generativity," or the capacity for a theory to open up "alternative metaphors" which can transform culture and society in keeping with chosen values.[15] Furthermore, proponents of the revaluation of metaphysics and others note that relativism as a truth claim fails prey to its own criticism; it too can only be a relative claim.[16]

In addition, the argument that we can never know reality in itself and must settle for approximations does not mean that there is no reality to be sought or experienced. It is possible, and fruitful, to be a realist in affirming that there is a reality "out there" or simply "here" to be confronted, interacted with, understood, sought, encountered (Manicas & Secord, 1983). Some "isness" exists—perhaps not recoverable or representable in nouns or concepts, or perhaps even in mathematical formulas or laws—yet worthy of study. This assumption in some form must be the fundamental tenet of any search for knowledge or process of inquiry. Second, we can affirm with idealism that knowledge can only be an approximation of what is ultimately real, an act of encounter inherently affected by the creativity and subjective character of the inquiring mind. Such an affirmation does not preclude the possibility of science, or necessitate a totally relative view of knowledge, but it tempers the claim of any human search for knowledge as capable of absolute certainty. This kind of realism, tempered by this insight of idealism, resembles critical realism (Barbour, 1974).[17]

The claim to take the possibility of truth and reality seriously, yet acknowledge the necessity of approximation in our expression of it, can rest on several bases. First is the claim to direct intuition of reality, a claim which has much in common with revelation as seen in world spiritual traditions (see H. Smith, 1976), and hence is the least likely to be used

by psychologists. Second is the claim that truth statements derive from experience, in the sense that any persons following a set procedure or practice (e.g., meditation) might evidence the same insight and experience of the world (see Wilber, 1983, 1984b). Johnson (1987) also defends a realism based on our bodily grounded experience which gives rise to structures reflecting this embodied understanding. Third is the pragmatic argument that truth is evidenced in the transformative effects certain perspectives and beliefs have on living (see James, 1963) or in predicting ways of operating in the world. And finally there are the "axioms of faith" that the world is real, and that we can in some sense come to know it, which surprisingly, come closest to the perspective that has guided modern science (Barrow, 1988, p. 26), augmented by pragmatic appeal to the usefulness of its formulations in predicting and controlling events.

Perhaps these seem slim underpinnings, but they are a starting point. As we are reminded in all cases of formal proof, one can never prove one's initial axiom. We begin always with certain axioms or principles which we assume, which in themselves cannot be proven. Truth may lie beyond provability of a given set of axioms, in that "provability is a weaker notion than truth" (Hofstadter, 1979, p. 19). Metaphysics returns to relevance not only in philosophy, but psychology too (O'Donohue, 1989). The challenge lies in becoming aware of fundamental postulates and remaining open to possible alternative conceptualizations which lie outside the current frame of reference.

> The students sit with great anticipation of their first class in college chemistry. Half of what I will be teaching you in this class will not be true, announces the professor to their great surprise. Unfortunately, their teacher adds, at this point in our knowledge I am not able to tell you which half.

We are never far in contemporary philosophy of science from concerns with the limits of knowledge. The fundamental challenge of science and inquiry is to walk the tightrope of doubt and certainty, allowing both to be measures of integrity in the pursuit of understanding. Absolute certainty is not the qualifying measure of science in the sense that knowledge can only be approximated in human language, concept, or scientific law.

Psychologists in particular must recover their capacity for experiencing ambiguity, perhaps becoming more like their introductory psychology students who feel inundated by contradictory paradigms. It is only too easy to teach and represent these paradigms compartmentally, immune to a full

wrestling with their implications. Pointing to the intrinsically paradoxical and contradictory quality of all great questions and answers, Koch (1981) criticizes much of the history of psychology for "cauterizing away the quality of ambiguity" (p. 269). The meaningful questions in life do not issue into safe and certain straightforward conclusions, but have a quality of mystery and complexity and are in turn embedded in larger questions affecting more encompassing levels of phenomena.

The search for secure, cognitive boxes which protect against ambiguity leads to "epistemopathy" (Koch) or "cognitive pathology" (Maslow, 1966). This cognitive style can affect science and all forms of inquiry, creating a tendency to avoid anxiety, defensively cling to findings as fact, and deny a realm for the intangible or unquantifiable. Among these cognitive pathologies Maslow (pp. 26–29) includes the "denial of doubt, confusion, puzzlement"; "intolerance of ambiguity"; "the need to conform"; "overrespect" and "underrespect for authority"; a "flight" into categorization; and uncontrollable "dichotomizing." In contrast, the world of experience is always judged to have more alternatives than the simple A or not A choice of classical logic. As seen in "quantum logic," reality does not inhabit only the two ends of a line, but all the points in between.[18] Science must include stages open to hunches and new ideas; knowing must be measured by degrees, not absolute certainty. Maslow (p. 135) reminds us that the heart of science is its commitment to the "empirical attitude," the commitment to observing for oneself rather than depending on authority, but science does not have to remove wonder and mystery. In fact at its highest, science issues in increased awe and wonder.

Even the bias of scientific questions in the direction of usefulness, prediction, and control may need to be challenged (Needleman, 1965). As long as the motivating question we direct towards the earth is how can we control and use what we find to enhance our own security, we will not discover all that the earth has to teach us. The utilitarian and fear-ridden nature of our questioning predicates certain types of findings and blinds us to other insights into the interrelatedness of our acts and the ecosystem of which we are a part. Questions focused on independently chosen, separate targets will rarely lead to insights into a total system.

Though the emphasis of this chapter has been on the limitations of knowledge, it is important to recall that we began this inquiry in search of an exit from the absolutism and narrowly conceived focus of a psychology steeped in radical behaviorism. Though this perspective has already been supplanted by a cognitive-behaviorism far more open in its assumptions, the philosophical issues at stake have not received wide enough attention. The result for psychology has been a tendency to carry over many habits from positivism into current mindsets. By reminding ourselves of the

limits of knowledge, we also paradoxically liberate ourselves to more fully examine our assumptions, widening the possible scope of both content and methodology considered appropriate for psychology. Thus the import of this self-examination as a field is the celebration of new avenues for exploration, a wider range of possible hypotheses to be taken seriously, and a promise of new metaphors more adequate to our time. In chapter 2 we continue this exploration, focusing on the importance of theory in scientific inquiry and the inevitable role of symbol and metaphor in stretching knowledge into new understandings.