

Relativity, Complementarity, Indeterminacy, and Psychological Theory

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Packer distinguishes three modalities of psychological inquiry—rationalism, empiricism, and hermeneutic phenomenology. The incommensurable nature of these modes of inquiry requires a critical assessment of psychological theory. The argument presented here is that none of the modes of inquiry has hegemony over the understanding of psychological events and that each modality is valid in its own right. This apparent crisis of incommensurability can only be resolved with rigorously formulated psychological concepts of relativity, complementarity, and indeterminacy—three crucial concepts drawn from physical sciences. The physical science concepts are described and a preliminary version of a psychological relativity paradigm is proposed. The analysis of the crisis of method requires that the object of inquiry for psychology be reformulated as public action and private experience.

The psychological community has experienced a growth of interest in alternative approaches to psychological phenomena. Recently Packer (1985) identified and discussed three modes of psychological inquiry: empiricism, rationalism, and hermeneutics (hermeneutic phenomenology). Empiricism is typically associated with behaviorism, functionalism, neobehaviorism, and operationalism. Rationalism would be associated with any number of structuralist approaches, from Levi-Strauss to Piaget and Chomski, as well as the cognitive psychology based in model building and analogy approaches (Packer, 1985); and the various schools of depth psychology. Hermeneutic and phenomenological approaches are also quite varied, ranging from the therapeutic strategies of Rogers to the approaches methodologically informed by European philosophical traditions.

While no final judgment has been made, these three approaches appear to represent three valid methods of scientific inquiry (see Cannon, 1985; Gergen, 1985; Kukla, 1983; Linschoten, 1979; Packer, 1985; Rachlin, Logue, Gibbon, and Frankel, 1986; Simpson, 1983). However, they do not produce commensurable interpretations of events. Several methodological and

theoretical problems arise because of this situation. First, a commonly held view of science (the positivistic view) would claim that only one of these views can be correct, so the different approaches are either invalid or actually derivative of a more comprehensive method. Second, the theoretical question of completeness must be resolved in the negative for all three approaches. Third, a question of uniqueness arises if in fact all three approaches describe the same phenomena. If we put aside the issues of whether the three methods of inquiry are indeed all valid and also put aside our disagreements regarding which approach is best or "right," the situation of having competing, valid approaches provides an opportunity for critical reflection and the exploration of what might be considered an anomaly of significant proportion (Kuhn, 1962).

Physics faced a similar problem in the early part of the century with the wave-particle problem in the physical interpretation of the phenomenon of light. The concepts of relativity, indeterminacy, and complementarity converged in the resolution of the apparent problem. These concepts can provide needed insight into the crisis of method upon which psychology verges.

While efforts to integrate psychological theory and the lessons of theoretical physics do not abound, recent developments in psychology warrant a closer examination of that possible integration. Insofar as theoretical physics is concerned with the nature of observation and verification, the exploration of common concerns is legitimate, and could lead to critical evaluation of psychology as a scientific enterprise.

Efforts at integration are confined to two possible routes. The most successful has been the approach of historical analysis initiated by criticisms based upon Thomas Kuhn's analysis of scientific revolution (Kuhn, 1962). Historians of psychology have turned to ever more sophisticated means of assessing the scientific status of psychology, first with the criticisms of Kuhn by Imre Lakatos (Lakatos and Musgrave, 1970) and then through the refinements of Laudan (Gholson and Barker, 1985). The second approach has involved the application of concepts taken from physics itself. These attempts range from global efforts like that of Lemert (1974), to more empirically based efforts like those of Stephenson (1983), as well as to statements of philosophical position like those of Snyder (1983a, 1983b). These three attempts, though important beginnings, have fallen short because they do not lead to the revision of psychological perspective mandated by a critical assessment of physical theory. Basically, they have attempted merely to graft the concepts of relativity (primarily), indeterminacy, and/or complementarity. Had these efforts been aimed at critical revision, they would have led to an altered view of psychological theory on the whole.

The following discussion falls into three parts. First, seven trends and contemporary issues with particular bearing upon psychological inquiry indicate a growing concern for the problems faced by psychology. These trends serve

as a mandate, in effect signalling a growing recognition of the contradictions arising from the various methods of psychological inquiry. This crisis of method is also discussed. Second, the physical theories of relativity, complementarity, and indeterminacy and their scientific and philosophical consequences are examined and parallels with psychological methods are drawn. Third, a full description of the integration of psychological theory and the relativity paradigm is presented. This includes a reformulation of the description of the object of psychological inquiry.

Contemporary Trends

Issues

Psychologists and others interested in the human sciences have begun to question the assumptions relevant to both methods of inquiry and the positivist orientation. These critical views are indicative of a broader trend of questioning the basis of human knowledge (see Rorty, 1979). While the paradigm of physics will provide a means of integrating these various tendencies, the criticisms produced by the approaches also contribute to the critical examination of the modes of inquiry in psychology. There are at least seven distinct issues that require discussion: (a) epistemology of the human sciences, (b) the constructionist position, (c) the nature of observation, (d) the rise of interest in hermeneutics, (e) the instrumentality of theory, (f) the temporal assumptions in psychological explanation, and (g) the problem of relativism.

(a) *Epistemology*. Packer (1985) raised the question of epistemology as a matter of central concern that has essentially been ignored in the rationalist/empiricist debates. Hermeneutic phenomenology is radically different in regard to its understanding of human knowledge. If the position is to be accepted, this concern must be addressed. A case study by Amundson (1985) exemplifies the difficulties psychological theories meet when their epistemological assumptions are at odds. Amundson analyzed the controversy between the cognitive and the behaviorist camps in the *place versus response* debate (that is, whether a rat learns a maze through place—requiring internal maps—or through response cues). The debate illustrates how each side understood a phenomenon in incommensurable ways *as a consequence of their epistemologies*.

Rorty (1979) has developed one of the more comprehensive attacks on the realist position of positivism (a view that scientific inquiry will reveal some knowledge of a real world remote from immediate experience; see also Amundson, 1985). Rorty's solution is that of a hermeneutic human science that accepts the contingent nature of human knowing and the temporal situation of that knowing. This direction in epistemology has advocates in both the natural and the social sciences (Gergen, 1985; Habermas, 1971, 1973; Heelan, 1983; Romanyshyn, 1982; Sardello, 1972; Scarr, 1985; Simpson, 1983; Stent,

1975; Van Den Berg, 1962, 1972). While these views do not acknowledge the parallel to relatively and indeterminacy, they do indeed verge upon the issues of situation of observation and indeterminate reality that make the realist position scientifically untenable.

(b) *Constructionism*. The constructionist position in psychology and social psychology accepts as fundamental the situated character of human knowledge (Berger and Luckman, 1966; Gergen, 1985; Scarr, 1985). The main theme of the world(s) of experience as active constructions of the experiencing being makes the issue of a remote "real" world insignificant when it is understood that the constructed reality is the one of importance for psychology. The theory as it now stands, however, suffers from the problem of historical and cultural relativism: Scarr's analysis of proximal and distal causes in the case of mother-child intelligence correlations suggests that knowledge is entirely contingent upon the prevailing interest to the point of solipsistic, uncritical acceptance. The constructionist position, and those positions similar to it (perhaps symbolic interactionism), contribute an important concept and verification to the current argument. If the world of public action is understood and analyzed as a constructed reality(ies), then the concept of private experience must be given a parity as it too is a constructed reality.

(c) *Objectivity*. The issue of the objectivity of the observer has been approached by several authors on several different grounds. Rorty's philosophical position, Habermas' critical theory approach, and the phenomenological psychologists (Cannon, 1985; Giorgi, 1971a, 1971b, 1979; Keen, 1975; Romanyshyn, 1982; Sardello, 1971; Van Den Berg, 1962, 1972) as well as the constructionists' position require a rethinking of the nature of observation. The observer goes to his or her task with the constraints of situation, interest, theoretical agenda, and instrumentality influencing the shape of the data. The contribution of this broadly based challenge to the possibility of objectivity is to raise exactly the issues of relativity, complementarity, and indeterminacy.

(d) *Hermeneutics*. The increase of interest in hermeneutic and phenomenological approaches must lend strength to Packer's inclusion of hermeneutics as a mode of psychological inquiry. That interest is in part a concomitant development with the return of "grand theory" to the study of human behavior (Skinner, 1985). While it may be a reaction to the empiricist and the positivist trends in psychology, most proponents argue for its legitimacy as a mode of inquiry in its own right (Heelan, 1983; Kukla, 1983; Packer, 1985; Rorty, 1979). Like the constructionist movement, the hermeneutic phenomenological approach is based in the situated, contingent, project-centered world of the experiencing subject. More important, however, is that hermeneutics and phenomenology are sciences whose primary concern is the nature of experiencing. The more interested psychologists become in understanding the details of human variability, the more a science based

upon hermeneutics or phenomenology becomes inevitable insofar as this approach is recognized to focus upon description of particular, personal experiences that complement the normative approaches of the other two modalities (Giorgi, 1971b, 1979; Linschoten, 1979; Paci, 1972; Sardello, 1971).

(e) *Instrumentality*. Habermas and Rorty have both argued, and from very different perspectives, that human knowledge is inextricably bound to human interests. Scarr and Amundson have supported this claim with case examples that demonstrate how this connection is in no way trivial. However, the interest contingency of theories and the knowledge they produce does not necessarily invalidate the theory. Validity should arise from conditions established by the theory. In the case discussed by Scarr, outcomes were flawed because researchers failed to investigate correlations of more "distal" factors (distal suggests factors more distant from the factor of immediate interest). The researchers' biases clearly flawed the outcome in this case because both the data and the technique for its analysis were part of the procedural protocol of the research. The claim of cultural relativism, that is, that the researchers focussed upon data that "served their interests," does not satisfy a rigorous concept of relativity because the disproof of the analysis was embedded in the very data used by the initial analysis. Relativity theory could not be applied in this case to allow competing interests to claim equal validity because such interests participate in the same frame of reference.

(f) *Historicism*. Historicism is often considered the major weakness of non-realist and anti-positivist programs. Historicism suggests that all knowledge is contingent upon human historical (that is, chronological and cultural) conditions to the extent that knowledge cannot be translated adequately from one time to another. This criticism, usually proffered by realists and positivists, shows how difficult it is to escape the positivist program. Refusing to accept the imperfection of human knowledge, the criticism displaces the location of the "absolute" from knowledge to time and cultural condition. If the historicism critique is at all correct, then it is completely correct and we cannot make sense of any record that is past except in our own terms of the present. But, since the present is meaningfully conditioned by the past, we should not be able to make sense of the present. (See Faulconer and Williams, 1985, for an analysis of the concept of temporality as opposed to chronology in historicism.)

(g) *Relativism*. Extreme historicism gives rise to relativism and pluralism without any means of testing theory against theory. Margolis (1983) has identified eight varieties of relativism. They include personal, social, ethical, and probabilistic relativism, among others. Of particular relevance for psychology is an attempt by Lemert (1974) to utilize the relativity theory as a challenge to the apparent pluralism in sociological theory. Drawing upon psychology as an example, Lemert confused relativity with relativism when he used Laing's notion of the relativity of madness as an example of the application of relativity

theory to psychology. Laing's poignant critique of our social and cultural milieu does not contribute to the kind of theoretical enterprise being attempted here.

These seven tendencies reflect persistent questioning of the scientific method as applied uncritically to psychology. As will be explored below, the rise of contemporary physics has forced the reformulation of the epistemological assumptions that undergird scientific methods. These critical tendencies indicate that psychology has been left with an outmoded and naively conceived approach to scientific inquiry.

Crisis of Method

Central to the task of assessing psychological theory in the terms of a relativistic paradigm is the recognition that psychology has borrowed from the modern (primarily nineteenth-century) natural sciences an unrealistic and somewhat outmoded conception of scientific method. This conception entails three basic premises so fundamental to the psychologist's enterprise that they are rarely questioned. The first premise of scientific method is the objectivity of observation. It is assumed that the natural sciences and the social sciences are capable of pure, unobtrusive and objective observation. The second premise is the standardization of measurement. The crucial assumption in this premise is that measurement is uniform or potentially uniform. The third premise is the replication of forecast. A number of assumptions arise here, primarily regarding the nature of causality.

These three premises are identified with positivism, a metatheoretical program that was largely abandoned in the natural sciences with the advent of contemporary theoretical physics. (I do not mean to ignore the contributions of the philosophy of science and theoretical mathematics to the demise of positivism [see Nagel and Newman, 1958].) Insofar as psychology continues to hold these premises as central components of psychological inquiry, the psychological enterprise will remain in the clutches of an inadequate, lingering positivist program for a unified, singular, and deductive science of psychology. The lessons from physics which will impact psychological theory the greatest are precisely those that were instrumental in the undoing of positivism.

If psychology is to borrow from physics any of its most powerful concepts—relativity (Einstein), complementarity (Bohr), or indeterminacy (Heisenberg)—then psychology must examine its own procedures and particularly its theoretical frameworks that depend so heavily upon this idealized conception of scientific method. The use of Kuhn's concept of paradigms (Kuhn, 1962) or Lakatos' concept of research programs (Lakatos and Musgrave, 1970) does not overcome the need to evaluate critically the competing theories. In fact, the identification of divergent research programs makes this need all the more pressing. Packer's identification of the basic theoretical approaches

allows critical assessment of issues of complementarity, indeterminacy, and relativity (see Lemert [1974] on sociological theory and relativity; and more recently Snyder [1983a, 1983b]). Lemert's efforts to apply physical concepts are important because they demonstrate the error of application without critical assessment. However, as argued above, Laing's critique is tangential to the present discussion. Snyder proposed a concept of "simultaneous situations" to deal with a problem of subjective relativism—thus narrowly (but correctly) applying relativity to the level of subjective experience (1983a). Relativity does not make all things "relative" (as we shall discuss below) nor does indeterminacy make knowledge fundamentally unreliable. These are precise theoretical concepts with explicit implications for psychological theory. Packer's organization of psychological inquiry into three distinct modalities can be used to integrate the precise formulations of the "relativistic paradigm" into psychological theory.

If psychology is to borrow the methods of scientific inquiry from the leading edge of scientific thought, and especially if concepts drawn from the physical sciences are gaining interest, then it is paramount that the ramifications of the application be explored. We cannot maintain a nineteenth-century view of natural order while invoking twentieth-century concepts about nature. The seven issues discussed above may in a sense be viewed as identifying anomalies that have resulted from this conflict between the nineteenth and twentieth-century ways of viewing nature. These trends suggest that a close understanding of the revolution in physical theory will provide much needed direction. One of the primary foci of this revolution was the re-understanding of the act of observation, an act that is also a crucial feature of psychological inquiry.

Physical Theory

Relativity, Complementarity, and Indeterminacy

Relativity theory in physics is based upon the experimentally verified invariance of the speed of light. Every measure of the speed of light produces a constant. This is primarily a consequence of the involvement of light in the process of measurement (Born, 1965; Einstein, 1956, 1961; Shamos, 1959). As light cannot be avoided in the measurement, the speed always measures the same. The problem of synchronizing the observation of one event with the observation of another (it helps if one of the observed events is a clock registering time), or the observation of the same event by two differently situated observers, is compounded by the invariance of the speed of light. As any observation must entail the invariant of light in the process of observation, observers at different locations see the same event at different times (relevant to the frame of reference of the event) due to the time required for the event to be carried from the location of its occurrence to the locations

of the observers. If the observers are moving in relation to the observed event, the chronology of the event may be observed by one to be A, B, and C and by the other as C, B, A. In another representation, two events may be seen as simultaneous by one observer but as sequential by another moving in relation to the first observer. This becomes most evident under conditions when the observers are themselves approaching the speed of light and moving in different directions. Einstein's analysis of this apparent anomaly in observation produced the theory of relativity (Born, 1965; Einstein, 1956, 1961; Shamos, 1959). The inability to judge the priority in time of one event over another except in the terms relative to the observer challenges the notion of any causal relationship between the events.

Relativity allows judgements about the possible relations between observers and observed events and is not the basis of any notion of "relativism," either cultural or personal (indeed, the term relativity was chosen for its far-ranging implications—but the choice of terminology cannot alter the specific and particular nature of the theory—see Holton, 1972). If one person views two events as simultaneous and another views them as sequential, then the correctness of the observation must depend upon the frame of reference in which it is made. Moreover, there are rules that govern the validity of any judgment made from any given frame of reference.

The theory of relativity can be understood to provide and confirm two crucial premises for psychological theory. First, it supports the psychological claims that observation is contingent upon the situation of the observer (see Snyder, 1983a). Second, observation must be meaningful and consistent in regard to that situation (frame of reference). The question of situation can be easily analyzed in physics, as the distance between observer and event is measurable in terms of standardized concepts of measurement. In psychology, there exists no definitive understanding of psychological distance and only weak assumptions about the nature of the relationship between the act of measurement and the event measured. Moreover, perhaps as Snyder, Lemert, and others have criticized, the frame of reference of psychological theorization and observation is frequently neglected.

The second component of the relativity paradigm is quantum theory. Bohr's complementarity thesis arose as a consequence of the breakdown of the ability of physical models to represent sub-atomic events. In certain circumstances, an electron behaves as a particle, in other circumstances it behaves as a wave. The same is true of light (Bohr, 1961; Heisenberg, 1949, 1958).

Complementarity allows an understanding of physical events based upon the "observational situation" (Lemert, 1974). If an electron is observed in an experimental condition that produces wave-like results, then the electron is a wave phenomenon; if observed in a condition that produces particle-like results, then the electron is a particle. No instruments or experimental conditions exist that can present the electron as both a wave and a particle. In

the case of the photon and the electron, these two common sense pictures of wave and particle are incommensurable and cannot necessarily be translated into one another (see Busch and Lahti, 1985; Gamow, 1966; Heisenberg, 1949, 1958; Lemert, 1974).

Thus, if we examine psychological events through the conditions set by empiricism, then our conclusions will tend toward describing events within the context and the constraints of particular stimuli and particular reinforcements or other observable public processes. The same is true for rationalism and hermeneutics; the end products of scientific inquiry will be rationalist descriptions or hermeneutic descriptions. Each mode of inquiry produces a "picture" of human behavior that is fundamentally incommensurable with those produced by the other modalities.

We may be able to describe and to account for a given event from all three perspectives—rationalist, empiricist, and hermeneutic. These three accounts could each be thorough and complete within the constraints and expectations of their respective theoretical perspectives. The completeness of each does not contradict the validity of any approach. However, if each approach is truly distinct, then each approach, while it allows a potentially complete description of the event in terms of its own theory, necessarily allows only a partial understanding of the event from the perspective of alternate approaches. For instance, if we understand the event empirically, then we are limited to understanding the knowledge generated by the rationalist and the hermeneutic approaches only insofar as that knowledge can be translated into empirical description. This is the heart of the complementarity thesis.

Heisenberg's uncertainty principle, also known as the principle of indeterminacy, evolved as a means for understanding why the measurement of the position *and* momentum of a moving electron was theoretically impossible. Heisenberg developed the principle in an effort to answer the questions that arose in quantum theory, and the principle of indeterminacy and the complementarity thesis are mutually supporting ideas.

The act of measurement involves the use of at least one reflected photon or the passage of the electron by a magnetic sensor. In either case the motion of the electron is altered. One can discover the position or the momentum of an electron with great accuracy, but one cannot discover both the momentum and position because the instrument of measurement, in measuring one aspect of the electron with accuracy, alters the other quantity to a degree that is *indeterminate*. Heisenberg summarizes the concept in the following manner:

The uncertainty principle refers to the degree of indeterminateness in the possible present knowledge of the simultaneous values of various quantities with which the quantum theory deals; it does not restrict, for example, the exactness of a position measurement alone or a velocity measurement alone. Thus suppose that the velocity of a free electron is precisely known, while the position is completely unknown. Then the princi-

ple states that every subsequent observation of the position will alter the momentum by an unknown and undeterminable amount such that after carrying out the experiment our knowledge of the electronic motion is restricted by the uncertainty relation. (Heisenberg, 1949, p. 20)

Application of the complementarity thesis to this problem results in the view that "complete knowledge of one necessarily means incomplete knowledge of the other" (Heisenberg, 1971). The indeterminacy may be generalized to state that observation interferes with the observed event (Heisenberg, 1958). As Bohr says, "According to the quantum theory, just the impossibility of neglecting the interaction with the agency of measurement means that every observation introduces a new uncontrollable element" (Bohr, 1961, p. 68). What can be judged with relative accuracy is the *probable* momentum or position.

Psychologists have been aware for quite some time that their research—measurements of all varieties—alters the subject of research in some fundamental way. There seems to be little consistency, though, in the degree of awareness and the significance of the impact that their research has upon its subjects. Human variability on the one hand and human ingenuity—which leads to awareness of the experimental design—on the other hand, precludes completely "objective" observation. Variability cannot be removed through "infinite sample size" or a "perfectly precise experiment" envisioned by certain statisticians (Serlin and Lapsley, 1985). On the other hand, it is generally accepted that increasing the unobtrusiveness of the observation corresponds to a weaker experimental control—or at least a weaker *claim* of control—so efforts to avoid the ingenious subject through unobtrusive measures fail to remedy the problem of interference.

While it is reasonably well-accepted that observation alters the behavior of the observed, the complementarity thesis and its supporting uncertainty relation offer another critical insight into psychological theory. Measurements, observations, even interpretations from one modality necessarily preclude accurate measurements, etc., from the other approaches. The hermeneutic interpretation of conscious and directed activity precludes the interpretation of a stimulus arc, just as it makes the encoding process at the base of complex feature analysis secondary to the experience of the intentional act of focusing.

Scientific Consequences

The revolution in physics that began at the turn of the century produced some major consequences for scientific method and assumptions about the nature of the physical universe. Margenau and Smith (1957) identified three consequences of the revolution for physics. The first was the dematerialization of matter. Being neither particle or wave and a bit of both radically undermined the conception of matter that dominates the non-scientist's conception of matter even today. The second consequence was the discontinuity

of motion. As electrons moved in quantum leaps from one orbit to another, their jumps were not smooth transitions. These leaps do not conform to a Newtonian picture of matter in motion (see Bohr, 1961). The third is the necessary shift in the understanding of causality. This benchmark of classical physics was assailed from several arenas. Relativity makes it possible for an apparent "cause" of an event to actually be perceived as following the caused event. Contiguity in time and space is no longer sufficient to infer causality. Heisenberg's principle made causality indeterminate because measurement was indeterminate, thus making the deduction backward to previous positions and momentums equally uncertain (Heisenberg, 1949, p. 20). If causal relationships cannot be measured with certainty, then a definitive relationship of causality (required by the concept of causality) cannot be established (see discussions of this in Bohm, 1957; Bunge, 1967). Moreover, Margenau and Smith argued that the barrier was a theoretical barrier and not technological. We cannot await a time of better instruments because it is observation itself that generates the problem.

These basic consequences can be understood by picturing our typical conception of reality. We assume reality to be continuous, objectively meaningful, and determinate (Lemert, 1974). These three consequences, as presented by Margenau and Smith, deny each of these assumptions in turn. As matter did not fit classical pictures of the material world, it lost its objective meaning. The idea that electrons leap from one orbit to another challenges our sense of continuity and our ability to picture the action. The impossibility of producing purely objective observations, assailed by relativity, quantum theory, and indeterminacy, undermines our typical view of reality as fairly determined by forces that can be comprehended. In fact, these assumptions are at the root of the positivist program that currently plagues the dominant conceptualizations of the psychological enterprise. They reflect a naive realist position that has received criticism of late (Faulconer and Williams, 1985; Gergen, 1985; Scarr, 1985).

We may summarize the relativity paradigm in the following manner: relativity makes the description of reality contingent upon the observer, and quantum theory describes that contingency of the observer as inescapable and interfering to an indeterminate degree. For psychology, this requires that the contingency between described realities—whether they be private experiences or public actions—and the act of observing these realities be recognized as a real and influential interrelation that cannot be separated. The application of the relativity paradigm to psychological theory must bring with it consequences already heralded by these directions of theoretical discourse. What remains now is to examine applications of relativity, complementarity, and indeterminacy to psychological theory, as conceptualized into three modalities by Packer, and to the object of psychological inquiry as understood in these three modalities.

Psychological Theory

Public Action and Private Experience

If Packer's three modalities are accepted, at least conditionally, then it is necessary to formulate the object of study of psychology as a whole in such a way that all three modalities can be meaningfully differentiated *on the basis of how they conceptualize that object*, as well as how they conceive their methods of inquiry. For psychological theory, the three methods of inquiry and the description of the object of inquiry must obtain complementarity relations and be subject to indeterminacy and relativity. We cannot explore the relativity paradigm at methodological levels without rethinking the descriptions of the object. Bohr found that complementarity solved several problems, not only of a methodological nature but also the incompatibility of wave and particle depictions of the electron. It is necessary to recognize that these three psychological methods generate incompatible pictures of their object as well.

The focus in phenomenological and hermeneutic psychology upon the conscious experience of events and the subject's consciousness of objects contrasts with the focus upon mechanisms and overt behaviors in the other two modalities. As the phenomenological modality is primarily interpretive, that is, a matter of how the individual experiences an event, an effective treatment of this apparent dichotomy would be to reformulate it as a psychological distinction between public action and private experience.

I propose the following understanding of public action and private experience. Public action and private experience describe two dimensions of psychological life as it is manifest in observations produced by rational, empiricist, and hermeneutic inquiry. These two dimensions compose the universe of behavior examined by psychology and thus constitute the object of psychological inquiry. As such, the three theoretical modes presented by Packer can be distinguished by their different approaches to this object of scientific inquiry.

Public action entails all actions that can be observed or are potentially observable by the actor and others. Private experience is that part of action or behavior that cannot be shared with others in the form in which it is experienced. A dream, for instance, is a private experience. We can only share our dreams by translating them into language or some other medium of communication. Thoughts and feelings are similar to dreams. A feeling, though it can be monitored as a public action, cannot be shared in the form in which it is experienced. Should two individuals be manipulated to have the same bodily states—they would not share the same feeling. Private experiences are inextricably bound to individuals and can be shared only so much as they can be translated into a public event. "Translation" radically alters the event we call experience. Neither public action nor private experience carries a

criterion of uniformity. A single event may participate in multiple realms of interpretation and belong to several different public realities. Public action does not exist without private experience, and private experience is meaningless without public action. The projects of psychology lead to a state in which knowledge of one is inevitably achieved through the other—essentially, they are complementary components of the object.

One is tempted to associate introspective, subjective data with the realm of private experience and to associate objective data with that of public action. Such an association is far too simplified. Private experience can be explored through the means it commands for becoming public, particularly the methods of hermeneutic and phenomenological inquiry which explore the character of human knowledge and human experiencing as situated events. The rationalist approach explores the private side through the explanation of such phenomena as consciousness, attention, memory, etc.—making public these events through the models that account for their existence and processes. While the content of private experience cannot be shared, it can be systematically *described* and *interpreted* within the constraints of reasonable methods. Likewise, public action may belong to the empiricist, but only insofar as he or she can reduce those actions to measurable and reproducible bits of data—and usually only statistical pictures of those data because the bits in themselves are meaningless.

It would be an error to suggest isomorphic relationships between “subjective” and the private and between “objective” and the public. The extremes of these two dimensions are constructs for the purpose of psychological theory. We may discover that any given event is never perfectly understood by any single approach—only completely described; and that prior to the interference by the scientist, psychological events are imperfectly influenced by stimuli, partially controlled by physiological structures, and rarely given more than a partially and imperfectly articulated understanding by the agents of the event. So, before the empiricists “go for the throat” of hermeneutics, and before the rationalists do the same to the empiricists, it may be in the best interest of the phenomenon to allow each approach to reach its potential of consistent descriptions of events and subsequent accounts of them.

Private experience and public action are abstractions from psychological life, but they are necessary for the understanding of psychological inquiry as a scientific enterprise. Each modality must abstract its object in a regular and predictable manner. The important theoretical criterion of completeness—that the theory offers a complete account of events—is also challenged by this view of the necessary abstraction of data, and the metatheoretical statements of relativity, complementarity, and indeterminacy are a means of resolving this problem of incompleteness. In effect, the private experience-public action distinction produces for psychological theory a problem parallel to the wave-particle problem in contemporary physics.

Psychological Methods

Empiricism. The realm of behavior as empirical object presumes that objectivity can be achieved within the constraints of stimuli, response, and reinforcement (see Packer, 1985). Events must be accounted for through the most proximate of stimulus-response connections. The claim of objectivity of the empirical scientist assumes some variety of "observation sentence" (from Quine, see Rorty, 1979) that cannot be falsified, that is to say, it assumes observations that are purely public thus beyond challenge. Kukla has argued that observational reports that have public nature like those of empiricism are no more necessarily valid than the observations of introspection (all observation is essentially some kind of introspective translation; Kukla, 1983). Prior to any application of relativity or complementarity one must accept the notion, discussed above—that no ideal mode of observation exists and that statistical solutions cannot compensate through infinite sample sizes (Busch and Lahti, 1985; Serlin and Lapsley, 1985). This does not invalidate the empiricist project. Observations can still be replicated and publicly verified—as allowed by relativity and indeterminacy. These conditions of observation make verification necessarily incomplete as a consequence of the contingency of the observer, a concept not allowed by the pure "observation sentence," and of the indeterminacy of the judgment. (Psychologists already utilize statistical techniques for the *correction of the variability of data*, a recognition of the imperfection of the relationship between event and observation as well as the random nature of the event.)

A description of the empiricist program governed by a relativistic paradigm will not differ radically from the already accepted picture. Empiricism must be understood as an inductive process of description constrained by a precise language of public action. Empirical theory manipulates the description (data) of public action in order to account for the event in terms of correlations of sequences of public action (behavior is described in terms of other behaviors at the same descriptive level). The configurations of public action must be consistent from one moment to the next, and these configurations may regularly confine data to precise patterns of occurrence. Private experience is defined by the empirical program as any aspect of psychological life that cannot be made public in the terms of empirical description.

The empiricist program can claim all the attributes of scientific validity (assuming a consistent application of procedures and theory) but it cannot venture claims about the accounts produced by competing theories (if those approaches have a scientific parity judged on the basis of their own internal consistency). Essentially, these theories cannot make claims regarding their completeness as theories (this issue has been demonstrated by Gödel for mathematics; see Nagel and Newman, 1958).

Rationalism. The rationalist program, as described by Packer, creates *models*

of behavior (centered upon models of cognition that generate behavior). These models are by their very nature internal or remote from the realities for which they account. Unlike the empiricists who account for behavior in the terms of behavior, the rationalists are constrained to account for public action in the terms of constructed, hypothetical processes that are very remote from overt action. An example may be found in the role of the neuron in cognitive processes. While the neuron serves as a basic unit in many processing models, it is entirely removed from our experience and extremely remote from direct observation. In many cases, the model may not have a corresponding physiological entity. Rationalism must be understood as a deductive process of description constrained by a model that defines the terms of description.

The validation of the model may proceed in an empiricist manner, but the inquiry is guided by the model, not the value-free inquiry sought by the empiricist (though "value-free" inquiry is necessarily impossible). Rational theories propose models of private experience-public action relationships that in most cases seek an accurate description of both private experience and public action. The proposed models may in fact be remote from both private experience and public action (note the information processing models based upon brain physiology). The description of behavior is not confined by the public or private realm in which it occurs. A useful example may be the encoding process involved in visual perception. While mental events of feature analysis concerning brightness, color, shape, and location may be empirically demonstrated, the models of the activity describe events that cannot be verified by hermeneutic methods or the reflex arcs of behavioral approaches. The account of public action is a rule-governed relationship based upon a combination of private, public, and remote (the model) configurations of data. Rational theory manipulates model-generated rules in order to account for the configurations of public action and private experience. The public action that confirms the model occurs at a different level of observation than do the processes that support it. The same holds for the private experience of a visual representation—the experience does not relate to the processes that are described by the model except at points where the processes converge to produce a completed picture.

The model is an invariant in the rationalist program. While it must be flexible enough to account for all possible deviations, at its root it must offer a universal analog of psychological life. Eventually, this model of human behavior may be *described* by the physiological processes which underlie experience such as perception, cognition, and action. Even if it is able to describe these processes completely, the description will *necessarily not conform* to the observations made at the public and private levels defined by empiricism and hermeneutics. For the empiricist, a response that confirms the presence of a visual stimulus may imply the underlying processes, but it does not entail a description of them. A similar scenario holds for the phenomenological

report of seeing a flash of light (subjects will never describe the light in terms of the neurons that fired). The identification of structure will not make the model any less an abstraction from psychological life.

Hermeneutic phenomenology. The hermeneutic program is primarily endogenous. As a method of inquiry, it seeks to produce descriptions of human experience in the manner in which events are experienced. Both public action and private experience are interpreted by the individual within that individual's situated, context-contingent perspective. Moreover, individuals become aware of differences between their and other's perceptions of events and can interpret their behavior according to these differential perceptions (as is evidenced by attribution theory). The goal of this mode of inquiry is accurate description and interpretation of experience. This goal is properly contrasted with the descriptive and manipulative goals of empiricism and rationalism.

The significance of describing events in the language of experience, as compared to the language of behavior or models, becomes most apparent in the area of temporality. The rationalist and empiricist descriptions utilize an arbitrary chronological measurement as a means of standardizing observation. Indeed, each may place a different priority upon the chronological sequence—their sequences may be incommensurable (see below), but both use this sequential temporality (see Scarr, 1985; and Faulconer and Williams, 1985). Temporality is understood differently in hermeneutics. Each individual experiences time differently, and each event influences different temporal experiencing. Time is experienced as a relation of events, and particularly in how past and future projects (the horizons, in phenomenology) influence or even govern current actions. Time is constructed by the experiencing individual from this relation of events.

Psychological theory. These three modalities produce several incommensurable conceptions of psychological life. Using the physics paradigm in a metatheoretical application (we are not likely to discover something equivalent to electrons, photons, and the speed of light in order to make a direct application), it should be possible to make statements regarding the validity of incommensurable psychological theories. The objective of such statements is to accept the seeming contradictions within the science(s) of psychology as consequences of the complex nature of psychological observations.

Relativity has been translated into psychology in two ways. The first is the relativism suggested by Lemert. His interpretation leads only to the awareness that judgments concerning psychological phenomena (like madness) are conditioned by the perspective of the judging observer. That judgment is contingent upon theory (and theory is perspective contingent). More is at stake than judgments, as equally valid scientific claims produce contradictory results. Snyder's (1983a) analysis of psychological relativity is confined to the level of the situation of an individual within a "perspective view." These two at-

tempts fail to take into account the single most important element of relativity: the necessity of two observers with inconsistent reports of the same phenomenon. Lemert's view "relativizes" a single theoretical interpretation, and Snyder's view "relativizes" the individual observer. There must exist some need to demonstrate the relativity of two separate observations, not of a single one (either theoretical or individual). This necessity arises with the three modalities of psychological inquiry. A particular public action may be understood by all three modalities, and each may propose a different chronology of events and inference of causal relations based on that chronology.

A simple example should illustrate the relativity of theoretical perspectives: when I drive home from work today, I repeat the experience of driving that occurs in a rather regular rhythm. For the empiricist, my behavior conforms to a habitual pattern of stimuli and responses. These responses, which include appropriate responses to significant stimuli, are without significant error and demonstrate a certain efficiency apparent from long-term conditioning. The sequence of events flows continuously from stimuli to response. For the rationalist, I am in the process of interpreting large amounts of information and making numerous decisions concerning speed of the automobile, the lane of traffic I choose to be in, and the route I have selected. For the rationalist, consciousness has a temporal priority over external stimuli, as I make particular commitments of attention to certain kinds of stimuli (at a deeper level, the attention mechanisms manage my capacity to attend to a given script of driving home).

For the behavioral empiricist, consciousness is epiphenomenal and thus *not* prior in time to stimuli. These two sequences of events are incommensurable. From the hermeneutic perspective, I am repeating the experience of driving home, and that repetition recollects all the previous trips as I take for granted the act of driving home. But as I drive home, *I am already there*, playing with my children, eating dinner, unwinding from the tedious drive. The phenomenological focus of my activity is my being home, and the promise of relaxation it offers reinforces my eagerness to get there quickly and without interference. This temporality, experienced as a future that governs the present, cannot be reconciled with the sequential conceptions of the other two approaches unless it is translated into the other modes. The translation would alter the interpretation of the event by reducing the primacy of the private experience to either a secondary phenomenon due to consciousness' freedom from habitually governed behaviors or an epiphenomenon related to the reward structure of returning home.

The metatheoretical statement of psychological relativity must draw directly from Einstein's focus upon the perceived order of events. The temporal relation of events is a theoretical judgment in which different theories may assess the relation of events in a differential fashion. The behaviorist view of the

epiphenomenon of consciousness is a good example. For the empiricist, the temporal relationship of consciousness to events is irrelevant to the description of the stimulus-response relationship, and for those who accept the concept of consciousness, it may be judged as after the fact of conditioned responses (thus epiphenomenal). A more radical perspective can be suggested for the empiricist: the character of consciousness is such that it is theoretically atemporal—having no meaningful impact on behavior, it holds no necessary temporal relation to sequences of events. In cognitive science, the kinds of processes involved in relating a stimulus and a response determine whether awareness is primary or secondary, prior or post facto, directive or epiphenomenal. There will thus exist events in which consciousness of an event (or consciousness as an event) is judged by one perspective as prior and directive and judged by the other as epiphenomenal to behavioral sequences. Hermeneutics could argue that it is the interpretation of the event by an experiencing being that is prior and directive. Relativity allows these judgements concerning sequence to be considered valid if they are valid within their frames of reference.

The complementarity thesis can be accepted without any translation whatsoever. If two or all three theories produce incommensurable interpretations concerning the same event, and if those interpretations are valid, then a complementary relationship exists (this does not mean that they can be added together to make a whole theory out of two complementary halves). The descriptions produced by each theory may be complete in their own terms (but completeness can only be speculated—see Nagel and Newman, 1958); however, their completeness does not produce hegemony over the understanding of the event. As with the illustration above, the hermeneutic interpretation of driving home can only be translated (understood) incompletely by the other two approaches. For the empiricist to understand the knowledge produced by the rationalist's approach, the sequence of events must be altered, thus making the knowledge produced by the rationalist incompletely understood by the empiricist. Private experience cannot be translated into public action without loss of the essential nature of the privateness. Moreover, the descriptions generated by empiricist and rationalist approaches create information that cannot be integrated into the phenomenological view because it is beyond conscious experience. The public actions observed by empiricism and rationalism are different public actions, and the relation of these public actions to private experience is governed by different rules in each case. Amundson's case study and Scarr's analysis of proximal and distal factors demonstrate the problem if some kind of complementarity is not developed. Rachlin et al. (1986) have developed a means of translating between behavioral and cognitive approaches to describing animal and human choice. They conclude that both approaches are at least partially correct. Though they state a preference for the behavioral approach, it is clear that the preference con-

cerns theoretical interests and not theoretical accuracy. These two approaches must be considered complementary in that they result in valid accounts of the phenomena but produce pictures of the events that are not commensurable. This incommensurability suggests that one approach cannot be reduced to the other without losing some essential aspect.

The necessity for a principle of indeterminacy in psychology arises from the nature of psychological life. Relativity and complementarity generate solutions to the problems inherent in having three competing theoretical approaches, but they do not require a recognition of a unique aspect of psychology. Every event has the potential to change human experience and to alter behavioral patterns.

That the mechanisms of change and alteration are different for each competing psychological modality is another point of incommensurability between the theories. Empiricists assume a behavioral concept of extinction that allows the theoretical consideration of an unaltered subject at the conclusion of an observation. Rationalists assume an enduring structure that remains fundamentally unchanged after any discreet event and altered only through long term development or degeneration. On the other hand, the hermeneutic modality recognizes that each experience changes the character of the experiencing being. Being observed is an event that must be integrated into the experience of the individual. The uncertainty of knowledge with regard to the degree of change, its direction, and its impact must be recognized as an inevitable consequence of observation. It is this alteration that transforms psychological life from its lived status of partially understood motivation, imperfectly defined stimuli, and elaborately intertwined physiological patterns into a scientific object of public inquiry. Theories and scientific procedures are the instruments of this transformation from a prereflective attitude into a crystallized data.

Where indeterminacy in physics arises in a singular problem of necessary observational interference, indeterminacy arises in a multitude of interferences in psychology. It may occur in trivial cases of forced choice questionnaires in attitude measurement in which the subject must choose from a set of responses that does not represent the subject's interests. It may occur in the demand characteristics of even the best designed experiments. The simplest statement of indeterminacy for psychological theory is that, due to the nature of the organism being studied, the effects of observation cannot be shown to be completely reversible. The irreversibility of observational interference, due to the uncertainty or indeterminacy of the interference, must be understood as a fundamental element of any psychological theory.

Consequences for Psychological Theory

The consequences of applying a relativistic paradigm to psychology are

parallel to the consequences for contemporary physics. There are epistemological and ontological changes in the conception of the science of psychology.

With regard to the conception of knowledge, indeterminacy and relativity require that knowledge be understood as contingent upon the observation and that the relationships observed in an event are contingent upon the conception of temporality inherent in a particular theory. The observational instrumentality of psychological theory is inescapable. But this instrumentality is also the means by which most psychological knowledge becomes possible. Theoretical abstraction and observational interference are necessary components of scientific inquiry. The nature of the object as fundamentally indeterminate—a consequence of private experience—means that complete descriptions of psychological life are unattainable.

Rather than experience the dematerialization of matter, psychology must undergo a “dematerialization” of the human subject. That dematerialization may be figurative in the sense that we believe ourselves to be continuous, embodied consciousness (derived from private experience). However, statistical techniques already enforce this dematerialized subject, but they do so with a naive view that “real” subjects exist out there somewhere. While this distinction may be irrelevant to the empirical and rational approaches, it is crucial to phenomenological inquiry. Humans have various body images and a variety of ways of embodying their interests (Keen, 1975; Romanynshyn, 1982; Van Den Berg, 1962). As experiencing beings, we detect these subtle ontological differences and will live them simultaneously as a body-for-self and a body-for-others (see Packer, 1985). The subject of scientific inquiry cannot automatically be assumed to be a continuous subject. Indeed, scientific rigor would require that the subject be recognized according to its scientific description: a bundle of responses or a bundle of neurons, or even a collection of intentional projects. Furthermore, the reality inhabited by this subject is not necessarily continuous, but may be a discontinuous array of theoretical interests. The agent of action in these different realities may reside physically in the same body, but because the body is the instrument of action for each of these different modalities, the scientific descriptions produce ontologically different bodies (and worlds of experience).

The question of causality cannot remain unaffected by these prescriptions for psychological theory. The contingency of observation and the differential descriptions of sequences of events make causality itself contingent upon the theoretical program. The understanding of time as both an experienced phenomenon of metered duration and as the interpreted relation of events requires that concepts of temporality be recognized as theory specific. This understanding of time further undermines any possibility of a superordinate concept of causality.

Conclusion

The arguments presented here can be construed to suggest that all three modes of inquiry suggested by Packer should be treated with parity. The theoretical interests of each make it unlikely that any single theory will ever unify all the legitimate concerns of the three programs. Relativity, complementarity, and indeterminacy are not yet theoretical principles for psychology in the sense that they are for physics. They should be considered metatheoretical guides to developing a means by which all three programs can simultaneously be in a progressive phase (Gholson and Barker, 1985). The recognition that theories reflect vested interests should not suggest that these interests are unhealthy. We must continually rethink the nature of our methods and the implications these methods have for the understanding of the entire domain of psychological life.

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