heuristic value, pointing out some promising models and tools that may stimulate new lines of research in social psychology. In short, this volume should be viewed as introductory and generative rather than as comprehensive and exhaustive. It is our hope and our conviction that in the years to come, social psychology will come to embrace many of the leads advanced in the contributions to this volume.

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1. Introduction

Social psychology is too big for its own good. Indeed, no other area of psychology presumes to cover so much ground. Over the years, everything from muscle movements and heart beats to juries and societies has become fair game for theory and research in spirited attempts to understand human thought and behavior in interpersonal contexts. Although such far-ranging eclecticism makes for an intellectually stimulating discipline, it also is a breeding ground for conceptual chaos. With no single level of analysis cutting across topical boundaries, and with the topical boundaries themselves encompassing virtually every feature of our daily interactions with the world, it is hardly surprising that there is little theoretical coherence in the field as a whole or that there is even less consensus regarding research paradigms. Such lack of theoretical, empirical, and operational integration has not gone unnoticed, of course. For many observers, the fragmented nature of the field has called into question the status of social psychology as a credible scientific discipline (cf. Gergen, 1985; Harre & Secord, 1972; Rosnow, 1981; Staats, 1991).

We suggest that despite the breadth and depth of the field, some degree of coherence is well within reach. This coherence will not be at the level of theory construction, however. As in any scientific discipline, different subtopics within
social psychology (e.g., person perception, group structure, intimate relations, and so on) ultimately must be understood in terms of their own phenomena, effects, and principles. The coherence we have in mind is at the level of metatheory—a set of concepts and assumptions from which to frame specific theories and broad paradigmatic guidelines for the generation of specific research methods. This metatheory, which has emerged in recent years to provide coherence for other areas of science (cf. Abraham & Shaw, 1982–1988; Glass & Mackey, 1988; Gleick, 1987; Haken, 1984; Prigogine & Stengers, 1984), is referred to as dynamical systems theory. A dynamical system can be informally defined as a more-or-less self-contained set of elements that interact over time in complex, often nonlinear ways. Before introducing this perspective and its potential for creating order out of the chaos of social psychology, we provide a brief overview of the current state of social psychology.

II. The State of Social Psychology

Social psychology does not suffer from a lack of empirical data. There are as many scientific journals devoted to the social context of human behavior as there are devoted to, say, microbiology, and each issue of each journal presents the results of numerous investigations that have passed muster with discriminating editors and tough peer reviewers. The problem is what to make of all the data being generated. Is it possible to incorporate the wealth of social psychological findings into broad, integrative theories? After all, it is theory, not data per se, that provides insight into long-standing issues (e.g., inner vs. outer determinants of behavior, the causal significance of consciousness) and allows us to generate definitive conclusions concerning important topics (e.g., group dynamics, intimate relations). By this criterion, then, what is the state of social psychology?

A. Theories, Issues, and Topics

There are several reasons to think that the answer to this question is not too flattering. To begin with, there are simply too many theories available to explain the same thing. Even with respect to relatively narrowly defined phenomena, there is often a host of competing theories stumbling over one another competing to provide the most convincing explanation. Intrinsic motivation, group polarization in decision making, attitude–behavior relations, self-presentation, and social facilitation, for instance, are hardly new concerns, yet each is currently open to several different theoretical interpretations, with little prospect of resolution in the near future. The theories that are advanced, moreover, typically have a narrow range of application (cf. Aronson, 1992), so that any insight provided into intrinsic motivation, for example, may have little if any relevance for group polarization, social facilitation, and the like. In effect, then, each topic has its own set of personal mini-theories.

Worse yet, some theories are themselves open to interpretation. Schlenker (1992), for instance, noted that dissonance theory—arguably, the most successful social psychological theory to date—has derived much of its power and appeal over the years from its ability to assume whatever form various devotees wish it to take. Thus, depending on who you ask, dissonance is described in terms of consistency, ego defense, consistency plus ego defense, or a state of negative arousal that occurs when people feel responsible for aversive outcomes (cf. Aronson, 1969; Festinger, 1957; Scher & Cooper, 1989). In varying degrees, such theoretical elasticity can be said to characterize other theories as well (e.g., social comparison, exchange, equity, self-awareness, learned helplessness).

Even the topics that define the field are ill-defined and overlapping. Is attribution a topic, an assumption about mental process, or a theory of social cognition? Is self-perception a subset of social cognition, or does it qualify as a distinguishable phenomenon? Does it make sense to discuss motivation without discussing goal-directed action? Can attraction be discussed independently of person perception? Is there a rationale for distinguishing social cognition from social relations? Can either attitudes or prejudice be fully understood if they are treated as separate phenomena? Of course, separate treatments of topics like attribution, social cognition, self-perception, motivation, action, attraction, social relations, attitudes, and prejudice would make sense if the topics were ultimately integrated in some fashion. Thus, for example, basic principles of social cognition could be developed, and these principles could be invoked when other topics (e.g., social relations, group dynamics) are discussed.

Unfortunately, however, it does not seem to work that way. The work explicitly devoted to social relations, for instance, certainly must acknowledge people’s feelings about one another, but such discussions typically bear little resemblance to the principles advanced in the literature on social cognition. Similarly, the literature explicitly devoted to attitudes has little in common with the literature on prejudice, as does the literature on motivation with that of goal-directed action, and so on. Such arbitrary boundary conditions become readily apparent on perusal of the table of contents in standard social psychology textbooks. Unlike physics textbooks, in which basic principles developed in an early chapter reappear in a later chapter to shed light on a macrolevel topic, social psychology textbooks invariably have a fragmented quality to them, jumping from one topic (e.g., attitudes) to another (e.g., social cognition or social influence) without the former being incorporated into the latter.

Because of the fragmented state of social psychological theorizing, the critical issues that generated all this attention in the first place remain to be resolved. Thus, surveying the field as a whole without adopting one theoretical stance at the expense of all its legitimate contenders leaves one wondering whether people are
ultimately more concerned with pleasure, security, consistency, achievement, approval, justice, self-knowledge, or self-defense; whether people's actions spring from internal states (drives, values, self-images) or are largely responses to social, situational, or cultural forces; whether people's judgments and opinions are basically rational and driven by information or are basically irrational and driven by passion; whether human nature is fundamentally good, bad, or a tabula rasa; whether people's thoughts arise independently of overt behavior and come to direct it or are simply an epiphenomenal sideshow; whether people are capable of deep introspective self-knowledge or are merely observers unto themselves; and whether people are capable of living together in harmony or are destined for conflict, no matter how benign the circumstances.

B. Causation and Prediction

Setting aside the concern over fragmentation, one can question how successful social psychological theories have been in explaining their respective phenomena of choice. Do theories of social cognition, for example, account for people's impressions and judgments of one another? This question is typically answered empirically, by assessing how much variance in the phenomenon of interest is attributable to variation in the theoretically relevant independent variables under investigation. By this criterion, one could argue that social psychological theories by and large are not all that explanatory. It is not unusual for investigators to claim support for a theory based on a study in which the independent variables collectively account for less than 15% of the variance in the dependent measure. This means that even in the most carefully controlled (i.e., contrived) investigation, the lion's share of the variability among subjects has nothing to do with the theory being put to test.

In view of the notion of determinism in classical mechanics—which provides the basic paradigm in virtually all social psychological experimentation—this would seem to be a sobering state of affairs. After all, in a Laplacian world all the variance should be accounted for. Classical mechanics, as epitomized by Newtonian principles, holds that nothing is left to chance and that if all the initial conditions associated with a phenomenon were known, one could in principle have complete and precise knowledge of the phenomenon at any time, regardless of how far one looks into the future. By implication, the better the theory, the closer one should come to explaining 100% of the variance. From this perspective, accounting for a measly 15% makes one's theories look pretty inadequate.

Note the assumption here that determinism implies prediction. In the conduct of research, in fact, prediction provides the criterion by which one assesses whether the independent variables in a study have a deterministic influence on the phenomenon under investigation. Thus, the investigator mixes various levels of the independent variables (suspected causes) at Time 1 and then looks at the value of

1. The Chaos in Social Psychology

the dependent measure (the effect) at Time 2. Only if the dependent measure varies in the predicted manner as a function of the earlier manipulations does the investigator claim support for the theory being tested.

The relatively weak predictive power associated with social psychological theories thus suggests that these theories are correspondingly poor at specifying causation as well. To boost the apparent strength of a theory, of course, one need only increase the number of subjects in an investigation; the more statistical power, the less variance must be accounted for in order for the obtained effect to be statistically reliable (i.e., unlikely to have occurred by chance). But from the point of view of determinism in classical mechanics, such an approach does little to strengthen one's faith in the ability of social psychology to generate powerful deterministic theories.

C. Boilerplate Excuses

Social psychologists, of course, are aware of these complaints. Even the most adamant believer in the value of contemporary experimental social psychology would not deny that there is a surplus of theories, that these theories are more often than not have a narrow range of application, that the topical layout of social psychology is based more on convenience and history than on an a priori natural category scheme, that fundamental issues have yet to be resolved, and that the predictive power of most theories is rather weak in an absolute sense. In the face of these problems, however, the erstwhile true believer has a number of ready-made explanations—or excuses, depending on one's perspective—with which to account for these seeming shortcomings. Three general explanations/excuses in particular are commonly advanced when critics press the point.

1. "Psychology Is Young"

This is probably the most common defense. Textbooks typically introduce the field as a young science—indeed, as the youngest science—and therefore as in somewhat of a preparadigmatic state. Most of the natural sciences can trace their roots back several centuries, which provides plenty of time for bad theories to be discarded and replaced with better ones. The first social psychology study, in contrast, was performed around the beginning of this century (Triplett, 1898). And whereas many of the basic paradigms and theoretical principles evident today in physics, chemistry, and biology have been in place for one hundred years or more, virtually nothing in contemporary social psychology was generated before World War II. By this logic, it is simply unreasonable to expect social psychology to be as mature, either in practice or in theory, as its natural science brethren. By implica-
tion, given enough time, social psychology too will have established paradigms, unequivocal principles, a clear topical agenda, and maybe even some resolved issues.

2. “People Are Complex”

This is a very compelling argument. Any given act can be seen as the net effect of the intersection of an untold number of factors, different sets of which correspond to different levels of analysis (Wegner & Vallacher, 1987). Greeting a stranger, deciding to go to college, running a red light, mailing a letter, getting drunk, washing one’s hands after a meal, and standing in line can all be analyzed with respect to myriad potential genetic, hormonal, familial, situational, dispositional, and cultural causes. And given that different acts performed by different actors at different times represent different intersections of such causes, it is hardly surprising that precious little variance in behavior can be accounted for with recourse to any single set of theoretically derived factors. Because one simply cannot control or account for all possible past and present influences, either theoretically or empirically, there is necessarily a large degree of indeterminacy in thought and behavior (see, e.g., Mehl, 1978).

Note that this argument is based essentially on practicality, not principle. Presumably, if all the contributing factors could be identified and controlled, one would expect to account for 100% of the variance. And if one accepts the implicit equation of determinism with prediction in social psychology, once such a comprehensive theory is developed, the behavior of every person should be perfectly predictable well into the future. In other words, it is assumed that there is a deterministic landscape stretching toward the future that dictates our every thought and deed; if we fail to predict future thoughts and deeds, it is only because we do not have a good map of the landscape.

3. “People Have Free Will”

No one really says this in so many words, but those who hold that social psychology does not, cannot, or should not conform to the natural sciences come precariously close to making a case for free will (e.g., Gergen, 1985; Shotter, 1980; Simon, 1982). The basic point is that people are unlike physical objects in that they do not respond in a direct and invariant fashion to the forces surrounding them. Instead, people act on the basis of reasons (values, beliefs, wants, concerns, etc.). Reasons, of course, do not have a material substrate and thus are not directly responsive to material forces (e.g., gravity, heat) in the way that physical objects are. Nor are reasons direct and invariant consequences of exposure to specifiable social forces. The same influence attempt (e.g., ingratiation, threat, bribery) delivered to two individuals, for example, might engage a desire to conform in one but a desire to resist in the other. Even within the same individual, different reasons can rise and fall in relative salience over time and across settings in a seemingly unpredictable (and hence uncaused) manner.

From this perspective, attempts to impose universal, deterministic laws on human behavior are doomed to failure and miss the larger point about the special nature of human action. Variations on this view find expression in a number of specific approaches to social psychology, including hermeneutics, radical social psychology, and constructionism (e.g., Gauld & Shotter, 1977; Gergen, 1985; Harre & Secord, 1972). Although investigations into human behavior are called for in these approaches, the emphasis is on capturing broad themes that weave together the fabric of people’s subjective interplay with the world around them, not on universal laws intended to predict specific behaviors under specific conditions.

All of these arguments have merit. The question is, what do we do with them? Assuming social psychology is young, do we simply adopt a patient attitude in the expectation that progressively more integrative and powerful theories will come to the fore? The emphasis on complexity, of course, suggests that we would have to be very patient indeed; the number of relevant factors is so staggering that it is unlikely anything even approaching a full accounting of human behavior will ever appear. Finally, if we adopt the free-will stance, all bets are off. The most comprehensive models imaginable, developed and tested with the aid of massive computing power, can never in principle dictate or predict how individuals will behave at a given time in a given instance.

In the face of these problems and their implications, most social psychologists tacitly adopt relatively modest expectations regarding theoretical integration. Although a grand unified theory is unlikely to appear on the horizon any time soon, if ever, we can certainly do better than we are doing right now, and there is reason to think that we will. The hope is that by sticking to our guns and working hard, we will gradually achieve an increasingly clear and integrated understanding of human thought and behavior. With maturity will come greater coherence, although perhaps not the degree of coherence attained in the natural sciences.

III. The Dynamics of Social Psychology

There is another way to think about the state of social psychology. We suggest that the problems identified thus far are not cause for abandoning a scientific approach to human thought and behavior but provide the very foundation on which new research strategies can be established. In particular, explicit attention to the complexity and seeming indeterminism of human behavior should enable theorists and researchers to capture the dynamics of social psychological phenomena. This orientation holds potential for fostering methodological and theoretical integration in social psychology and for bringing the field as a whole into better alignment with recent developments in the natural sciences.
A. Complexity

The complexity characterizing people is apparent on many different levels. At the level of brain function, there are approximately one hundred billion neurons, each of which is connected to hundreds, even thousands of other neurons. The number of possible patterns of neuronal firing is thus almost incomprehensibly large (cf. Sejnowski & Churchland, 1989). At the level of cognition, the number of specific thoughts, memories, images, and so on experienced by a given individual in even a mundane afternoon is again astronomically large, and the possible combinations of such cognitive elements renders it virtually impossible to capture all the nuances of someone’s thought process. Formidable magnitudes of complexity can be seen as well with respect to such psychological phenomena as motor coordination (e.g., Saltzman & Kelso, 1987; Turvey, 1990) and group dynamics (e.g., Nowak, Szamrej, & Latane, 1990).

People are not the only complex phenomena in nature, however. In recent years, scientists have come to realize that virtually every phenomenon can be understood as a complex system (cf. Gleick, 1987). The weather on a given day, for instance, represents the intersection of many different local conditions (e.g., barometric pressure, humidity, wind direction and speed) as well as the influence of distal events and conditions (storms, tropical depressions, volcanoes). None of these events and conditions—even something as seemingly insignificant as the flapping of a butterfly’s wings in a different hemisphere—can be eliminated as contributing factors to current and impending weather conditions (Lorenz, 1963). More generally, many phenomena of interest to biologists (e.g., the immune system), ecologists (e.g., predator-prey relations), chemists (e.g., autocatalytic reactions), physicists (e.g., lasers), cosmologists (e.g., galactic evolution), epidemiologists (e.g., the spread of viruses), and economists (e.g., economic cycles) are viewed today as multidimensional systems that have certain general features in common. It may be fruitful, then, to consider social thought and behavior from this vantage point as well (cf. Vallacher, 1989, 1993).

Treating a phenomenon as a complex system does not simply mean that one’s laws, models, theories, and research strategies have to incorporate many variables. The nature of complexity is such that the very nature of theory construction and theory testing differs from that associated with classical mechanics (cf. Davies, 1988; Gleick, 1987; Pagels, 1988). Perhaps the most basic point of departure concerns assumptions about causality and the relation between determinism and prediction. In the traditional model, it is assumed that specific factors can be isolated from one another and examined for their independent contributions to the phenomenon of interest. The systems perspective, in contrast, emphasizes the feedback among the relevant factors and the tendency of the system to become self-organized on the basis of patterns of such feedback. On this view, variation in any one factor is related in a nonlinear fashion to the behavior of the system as a whole; even a miniscule change in a given system element can, by virtue of its interactive feedback with other elements, promote dramatic, even qualitative changes in the functioning of the entire system.

Because each unique pattern of interactive feedback among system elements may be associated with a qualitatively different state of the system, and because the slightest change in the value of a single system element can make a profound difference in what state is observed, it is often impossible to specify exactly what the system will be doing at some distant point in the future. In classical mechanics, slight variation in initial conditions, or slight imprecision in their measurement, means only that there is a corresponding loss of precision in prediction. In marked contrast, the nature of complexity is such that variation or measurement imprecision can, under certain conditions, amplify into completely different solutions over time, thereby rendering even approximate predictions impossible. In modeling weather fronts, for example, Lorenz (1963) found that the slightest change in initial conditions—even a difference in rounding the initial ambient temperature and humidity—eventually led to entirely different patterns in his model weather system. More generally, anything short of infinite precision in one’s knowledge of a system at one time can undermine knowledge of future states of the system. Because infinite precision is impossible, determinism is no guarantee of prediction.

One does not have to be a weatherperson to appreciate how nonlinearity can undermine prediction. Consider, for example, your birth. The odds against any one sperm among the millions in a given ejaculate fertilizing an egg are astronomical. Had your parents delayed for even a second during their pivotal coital encounter, your existence would be in serious doubt right now, and any effect you have on the future would thus be nullified. Indeed, had any event during the past four billion years been even slightly different, the ripple effects might have been such that you might not be here to read this book. The same case can be made for an auto accident, an event that can change people’s lives irrevocably. Any accident represents not only split-second timing by the drivers, but also the precise confluence of events stretching back to prehistory. A collision in an intersection would not have occurred had one of the drivers experienced the slightest hesitation at an intersection three blocks earlier (or had one of them not been born).

B. Time

The distinctions between the classical mechanics and complex systems perspectives would probably go unnoticed if explicit consideration were not given to time in theoretical and empirical analyses. Indeed, it is only by tracking the evolution of a system’s behavior on some time scale that the essence of a complex system can be identified (cf. Abraham & Shaw, 1982–1988). Such tracking reveals the hallmarks of dynamical systems, including attractors, phase transitions, hysteresis,
critical fluctuations, and the emergence of macroscopic order from lower-level interactions (see Chapter 2). Because complex systems evolve and change in meaningful ways over time, assessing their nature at only a fixed point in time is as informationally impoverished as substituting a photograph for a motion picture (which, in turn, is an impoverished view of "real life").

Sometimes, of course, systems evolve toward a more or less steady state, so that useful knowledge of the system can be garnered from observing it at a single point in time (i.e., after reaching the steady state). The winding down of a pendulum, for instance, or the fall of an object to the earth represents instances of systems with fixed-point attractors—convergence of all the system elements to a fixed set of values. Even here, though, knowledge of the system’s evolution toward its final state reveals important insight into the nature of the system; different kinds of pendulums wind down at different rates, after all, and differently shaped objects under different wind conditions fall to earth with different trajectories.

Beyond that, it turns out that a fixed-point attractor is only a special case of temporal evolution in complex systems. Many systems display instead periodic evolution, or limit-cycle attractors, in which there is oscillation among two or more different states in a rhythmic fashion over time. In certain chemical reactions, for instance, the respective concentrations of two or more chemicals reverse in a fairly regular manner over time (Prigogine & Stengers, 1984); in predator-prey relations, there tends to be yearly oscillations in the relative numbers of the respective species (May, 1976). In other instances, quasiperiodic behavior is observed in which the system oscillates over time but never returns to exactly the same state as visited before. The joint behavior of two coupled pendulums with incommensurate periods can be characterized in these terms (Thompson & Stewart, 1987).

Finally, some systems evolve in a chaotic fashion, with no apparent regularity. Beyond the lack of periodicity in their behavior, these systems display extreme sensitivity to initial conditions. Change the starting point ever so slightly, and the system will evolve in a dramatically different manner. The weather, as noted earlier, fits this criterion (Lorenz, 1963), as do such phenomena as fluid turbulence (Ruelle & Takens, 1971) and predator-prey ratios under certain environmental conditions (May, 1976). It is in chaotic systems, then, that the distinction between determinism and prediction becomes striking. Although such systems are completely deterministic, the algorithm needed to model them must be as complex as the phenomenon itself. Any attempt to reduce the phenomenon to simpler rules renders prediction worthless. The situation is somewhat akin to needing a road map as big and detailed as Texas to figure out how to drive across Texas.

It is also the case that systems can show phase transitions—sudden and dramatic changes from one pattern of temporal behavior to another. This occurs when some feature of the environment controlling the system’s behavior changes in value. Kicking or otherwise "instructing" a horse to move faster, for instance, can produce a sudden transition from a trot to a gallop in the horse’s gait. A trot and a gallop, of course, represent qualitatively different configurations of the horse’s limbs that display different rates of oscillation (cf. Saltzman & Kelso, 1987). In like manner, the interval between water drops from a leaky faucet may change from slow periodicity to quasiperiodicity to chaos as the leakiness of the faucet changes (Shaw, 1984).

Although the information contained in the system’s temporal evolution is important in its own right, it also can be used to infer properties of the system. The form of a system’s temporal trajectory, for instance, can be used to infer the dimensionality of the system and the rules of interaction among the system’s elements (Eckmann & Ruelle, 1985; Grasberger & Procaccia, 1983). To understand the nature of a complex system, then, it is necessary to observe the system unfold over time. From this perspective, structure and process provide complementary and mutually supportive means of describing a given phenomenon.

C. Dynamical Social Psychology

It is easy to appreciate both complexity and time in human thought and behavior. As noted earlier, complexity is apparent on (and has been investigated with respect to) many different levels of human functioning, from neural networks to social networks. It is also reasonable to assume that at each level there is a corresponding time scale for the associated function, although such correspondence has not been explicitly documented. Thus, very short time scales characterize neural transmission and neural networks, whereas somewhat longer time scales are probably associated with cognition and social judgment processes, and yet longer time scales are almost certainly displayed by more molar phenomena such as social relationships and group dynamics.

Beyond conforming to different time scales, various social psychological phenomena may display distinctive patterns of temporal evolution. From a cybernetic point of view, for example, one might expect many phenomena (e.g., attitude formation, goal-directed action) to be associated with fixed-point attractors. In such models, motivation arises from a felt discrepancy between a current condition and a desired endstate, with various mechanisms operating to reduce the discrepancy and restore motivational equilibrium (cf. Carver & Scheier, 1981; Miller, Galanter, & Pribram, 1960; Powers, 1973). As suggested earlier, the nature of evolution toward an endstate may be revealing about the system at work—a possibility that investigators have begun to explore. With respect to goal-directed action, for instance, there is evidence that the rate at which a particular discrepancy is reduced maps onto emotion, with more rapid rates associated with greater satisfaction and better mood (Carver & Scheier, 1990; Hsee & Abelson, 1991).

Fixed point attractors, however, represent but one type of temporal evolution, and it is tempting to consider how other types might be manifest in various social psychological domains. In particular, there is reason to suspect that limit-cycle
attractors operate with respect to cognitive and behavioral processes, just as they have been shown to characterize certain biological processes (e.g., hormonal fluctuations, circadian rhythms). There seems to be certain rhythms to our moods, for example, and some form of periodicity may be inherent as well in our sentiments and judgments of others (see Chapter 11). The give and take in a social interaction might also be interpretable in terms of periodic evolution (see Chapter 7), as might the development and maintenance of long-term relationships (see Chapter 6). Our thoughts, interactions, and social relationships, in other words, may be dynamic rather than static, showing meaningful and measurable fluctuations over some time scale with respect to some key parameter of the process in question (e.g., evaluation, confidence, commitment).

It is also conceivable that whatever temporal patterns underlie various social processes can themselves undergo change in accordance with dynamical principles. In physical systems, such change takes place when the system is destabilized by some nonsystem disturbance (perturbation) in the environment. An oscillating pendulum, for instance, can easily be destabilized by pushing the bob perpendicular to its trajectory. When this happens, though, there is a tendency for the motion of the pendulum to establish a new oscillating pattern in fairly short order. It turns out that this scenario captures an invariant feature of all dynamical systems. Thus, a system may resist or dampen perturbations up to a point, beyond which there is a rapid collapse of the attractor. The instability itself tends to be unstable, however, so that the system tends to become self-organized with respect to a new temporal pattern.

It is easy to envision this scenario being played out in a variety of social psychological phenomena. In interpersonal perception, for instance, the waxing and waning of feelings about someone may become temporarily disordered by the receipt of inconsistent information about the target, only to become reordered with respect to a new (or perhaps the original) temporal pattern as the information is assimilated, reinterpreted, or discounted. The give and take of conversation in a dyad, meanwhile, can become disrupted when the interactants discover that they are being observed or when an emotionally charged topic is introduced. After a period of instability, however, the interactants may establish a new pattern of give and take that accommodates the altered circumstances. On a somewhat longer time scale, the natural ebb and flow of passion in an intimate relationship can become severely derailed when a baby is born or when an attractive stranger intrudes into the dyadic system. Eventually, though, the instability gives way to a new pattern of very close encounters (including, perhaps, a fixed point with zero values).

Unfortunately, these and yet other possible types of temporal evolution, not to mention the time scales on which they operate, are not well-represented in current social psychological theory. It is easy to see why. It is axiomatic in science that method shapes (and limits) theory (e.g., Kaplan, 1964; Kuhn, 1970), and this applies as well to social psychology (e.g., Gergen, 1973; McGuire, 1973; Rosnow, 1981). Although there is a wide variety of specific research strategies at the disposal of social psychologists, the majority of them share features that simply do not lend themselves to a dynamical systems perspective. For one thing, the predominant strategy, as noted earlier, is to select no more than three variables at a time for systematic manipulation, with all other potentially relevant variables controlled through randomization procedures. This is clearly at odds with the emphasis on identifying the qualitatively different states of a given system associated with particular patterns of interaction among all the system variables.

Perhaps more important, the dominant paradigms in social psychology are not equipped to identify the temporal trajectories of thought and behavior. In the prototypical experiment, the independent variables are manipulated at Time 1, and their (predicted) effects are assessed once, at some arbitrary Time 2. Beyond tacitly assuming that whatever process is at work converges on a stable state by Time 2, this approach is insensitive to the evolution of the process and thus cannot ask, let alone answer, a host of questions about the dynamics at work. Despite the abundance of work on impression formation, for instance, we do not know whether or to what extent people experience something akin to periodicity, quasiperiodicity, or chaos in their considerations of a target person in the process of forming a stable judgment of him or her. Similar gaps exist in our knowledge of such basic phenomena as social comparison, dissonance reduction, self-esteem maintenance, reaction to social feedback, conformity, and obedience.

This is not to suggest that contemporary social psychology is of little value or even that the experimental paradigms in place are inappropriate. Clearly, these paradigms have served us well, and we have learned a great deal about social thought and behavior because of them. Our point is that to generate a complete picture of human functioning, it is necessary to give explicit consideration to the complexity of social psychological phenomena and to the temporal patterns by which such complexity is revealed. Subsequent chapters in this volume suggest how this can be accomplished with respect to several diverse topics and provide testament to the benefit of doing so. In the final chapter, we summarize the methodological lessons of these chapters and suggest what remains to be done for a truly dynamical social psychology to emerge.

IV. Minitheory and Metatheory

Different phenomena must ultimately be understood on their own terms. Even within a given discipline, one should expect little theoretical commonality among different topics. In biology, for instance, the set of principles associated with photosynthesis, population ecology, and embryonic development are each fairly self-contained and disconnected from one another. From this perspective, it is unfair to criticize social psychology for spawning distinct theories for different topics. If
the principles of attitude change turn out to be different from the principles identified for, say, impression formation, then that may simply reflect the separateness of these two topics. One could quibble, of course, as to whether the topical distinctions in social psychology (e.g., attitude change and impression formation) are as sharply drawn as those in biology (e.g., photosynthesis and population ecology) to justify separate theories. And serious questions, too, can be raised regarding the plethora of theories within a topic (e.g., attitude change). But in principle, at least, the mapping of different principles onto different topics does not by itself represent a fatal flaw for social psychology.

With this in mind, one should not hold out hope that a theory will someday emerge that cuts across topical boundaries to explain everything about social thought and behavior. What one can hope for, however, is a broad metatheory from which to generate topic-specific principles and a set of paradigmatic guidelines with which to test and refine these principles. Such a metatheory and its associated guidelines may be already available to us under the guise of dynamical systems. This orientation has come to play a metatheoretical role in the natural sciences, providing integration at a macro level for phenomena as disparate as weather fronts, cardiovascular function, galaxy formation, hydraulics, and evolutionary biology. The principles, concepts, and methods of dynamical systems seem particularly well-suited to capture the complexity and dynamism inherent in virtually all topics in social psychology.

In practice, a dynamical systems perspective will sensitize researchers to a variety of effects (e.g., phase transition and bifurcation, pattern formation, critical instability, hysteresis, intrinsic dynamics) that are currently recognized only implicitly, if at all, in different domains. Such sensitivity, in turn, would do much to integrate a fragmented field by showing the manifestation of common processes in otherwise different domains and by introducing common methodological and analytical tools to these domains. Yet, the dynamical systems perspective is sufficiently broad so as not to constrain independent lines of investigation and the search for topic-specific principles. So although a theory of social thinking, for instance, would have some critical features in common with a theory of intimate relations (e.g., periods of instability followed by emergence to a new pattern), the two theories may reflect very distinct principles and may be tested with equally distinct methods. A dynamical systems orientation, then, not only holds potential for generating fresh research questions but promotes a combination of high-level integration and low-level diversity that signals maturity in both lay and scientific understanding (cf. Kaplan, 1964; Piaget, 1971).

However, perhaps more important than the potential for integration within social psychology is the possibility that the field as a whole can become integrated with other areas of science that are being recast in terms of dynamical systems (cf. Abraham, 1990; Gleick, 1987). Psychology is commonly perceived as lagging behind the natural sciences in its approach to understanding. In a sense, though, the emergence of a concern with complexity, instability, pattern formation, and the like in such mature fields as physics and chemistry signals a lag in the reverse direction. Behaviorism notwithstanding, psychology has always appreciated the complexity and concomitant lack of prediction in human functioning and has been keenly aware of the deadends ultimately reached by overly reductionistic strategies. However, it has taken recent developments in the natural sciences to provide the conceptual tools necessary to frame coherent, testable theories and thereby legitimize this perspective. Because this perspective resonates so well with psychology, it should be relatively easy for theorists and researchers to translate these tools into a set of concepts and operations appropriate for the study of the human system. Such a translation may provide a sense of what is truly basic to human experience, exposing the orderliness beneath the surface chaos of behavior.

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References

Dynamical Systems: A Tool for Social Psychology?

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I. Introduction

In the rapidly changing, turbulent, and unpredictable end of this century, the word chaos has suddenly become a fashionable term. This popularity does not simply reflect the fact that the social and political phenomena around us have become more complex, disordered, and difficult to understand. Rather, the fascination with chaos reflects a new meaning of the term, a meaning derived from recent developments in the natural sciences. Other keywords that have become popularized in the media and that reflect the same developments include strange attractors, bifurcations, hysteresis, butterfly effect, and fractals.