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Conclusions

It is easy to become absorbed by the details and possibilities of some of the theories that we have been examining. We certainly hope that these examples are stimulating to a wide range of social scientists. But we also hope that the detailed development of formal models and the theoretical experiments that have been conducted with these models are generally instructive in a methodology of theory building and evaluation. In closing, we should take a step back from the particulars and return briefly to the larger agenda that motivates the examples of theoretical research that we have developed in this volume.

The broader motivation underlying this volume is to reorient the way that social scientists theorize. Large bodies of social science theory describe structures and conduct analysis by the method of comparative statics; we have sought to emphasize the utility of theoretical work that focuses explicitly on processes and dynamics. A good deal of social science theory is expressed in "everyday" language, and some is expressed in formal mathematics. We have sought to emphasize the utility of formal, but nonmathematical languages as a tool for the expression of social science theories. Many theorists in the social sciences regard their work as done when they have presented general propositions. We have sought to show that there is a great deal to be gained by programs of theoretical research. To this end, the conceptual schemas of general systems theory and the method of computer-assisted simulation have been emphasized here.

Each of these emphases—on dynamics, on formalisms, and on theoretical research—offer considerable advantages as ways of "doing theory" in the social sciences. And, each emphasis suggests some new directions and challenges for social scientists.

Statics and Dynamics, Structures and Processes

The naming and classification of phenomena and the development of understanding by comparing phenomena are critical enterprises. Our

literatures devote extensive attention to such issues as forms of government, kinds of markets, personality types, forms of kinship relations, and types of societies. Great insights are obtained by attempting to understand the affinities among the elements of such "structures" by making comparisons among examples of them. Comparative "statics" are central to the social scientific enterprise.

There are, however, even deeper questions for social theorists: working out general principles of how structures come about, how they are maintained and changed. Theories of the processes by which changes are causally connected to one another—theories of dynamics—should also have a central place in social science theory. In some disciplines there has been considerable progress in developing theories of dynamics, in other disciplines there has been somewhat less. One of the goals of this volume has been to demonstrate that theorizing about dynamics can be pursued with the same rigor and richness that characterizes formulations of comparative statics in the social sciences.

Greater emphasis on theories of dynamics has profound implications for the ways that many social scientists think about problems, and for the kinds of explanations and evidence that they use. The method of understanding by static comparison calls for rich and thick description; exercises in verification based on comparative statics call for the classification of populations (or samples) of phenomena in cross-section. Understanding is achieved when the patterns of covariation among the traits defining phenomena fit together in consistent and replicable ways.

An emphasis on dynamics calls for different thrusts in explanation and verification. "Structures" come to be seen as the momentary and temporary realizations of the actions of (usually multiple) ongoing dynamic processes. The variability of phenomena is seen to be the result of different conjunctures of common underlying processes. Exercises in verification of theories of dynamics acquire a distinctly "historical" flavor under both controlled conditions (as in a laboratory experiment where the same dynamic process is replicated across subjects) and uncontrolled conditions (as in the study of the rise and fall of empires). It is the capacity of the hypothesized process or processes to produce, predict, and postdict trends and sequences that becomes central to evaluation of the theory.

The greater attention to dynamics that is advocated in this volume, then, leads to both theories and empirical research that have somewhat different flavors than a good bit of current work in many social science disciplines. Many empirical researchers and methodologists in all of the social science disciplines, however, are already headed in the direction of greater emphasis on dynamics and the analysis of over-time realizations

(some, of course, have always maintained this emphasis). The methods in this volume enable, and challenge, social science theorists to move in this direction as well.

Formalism: Language and Theory

The DYNAMO language for stating theories about dynamics has received a great deal of attention in this volume. The reason for this emphasis is that the DYNAMO language seems, to the author at least, a very powerful tool for talking about the kinds of things that social scientists talk about.

Because the language has a limited vocabulary and syntax, there is much less ambiguity (for both the theorist and the audience) about what is being said when the formal language is used. Yet, as I hope we have demonstrated, the highly structured language allows for the effective statement of quite complex ideas from the entire range of social scientific inquiry. Hopefully the use of such a language will ease communication across disciplinary boundaries in the social sciences, and allow greater cooperation and mutual learning.

The DYNAMO language deserves the attention that we have given it for a second and related reason: It is a special-purpose language for describing continuous state-continuous time dynamics. Not only does the syntax of the language aid in structuring the theorist's thinking, but it allows for the easier statement of extremely complicated multivariate and over-time relations. Theories stated in everyday language can approximate this complexity, but lack clarity and precision. Theories stated in formal mathematical form can approximate both the complexity and precision of DYNAMO models, but are incomprehensible to most social scientists. The DYNAMO language is also noteworthy because of its compatibility with the conceptual schemas of much social science discourse. The grounding of the language in general systems theory, and its strong differentiation between "material" and "informational" quantities is very consistent with the ways that many (though certainly not all) social scientists think and talk about problems.

We hope that we have demonstrated the value of the use of formal language in creating, stating, and doing research on social science theories with the examples in this volume. To the extent that the reader is convinced of this value, a new item can be added to the agenda of the social science theorist: the development of "smarter" formal languages for describing social relations. While DYNAMO is an extremely powerful and useful language, it is only a tool for discourse; new tools should be developed as the need arises. Languages having the same

virtues of user friendliness and strong syntax can certainly be developed for application to other kinds of social science problems, and, to some extent, have been. At the time of this writing, the particular problems of mixed continuous and discrete state models, mixed continuous and discrete time dynamics, and network relations models (e.g., for mental schemas, structures of kinships, structures of markets, patterns of political and social conflicts and exchanges for many actors over space and time) seem most in need of development of language.

Theoretical Research

For better or worse, social scientists often distinguish between "doing theory" on one hand, and "doing research" on the other. "Doing theory," I would contend, is much closer to "doing research" than is often realized. By both the general organization of this volume, and by the particular examples presented, I have tried to suggest that there is a good deal of "research" to be done on theories themselves.

A central concern of all social science theorists should be the clear explication of their ideas, and analysis of their internal consistency, limits, and implications. In "everyday language" theories and propositional inventories, rules of logic and deduction are used to accomplish this task. In mathematically formalized theories, methods of direct solution are often applicable. For theories of dynamics that involve large-state spaces and complex and nonlinear and contingent relations among traits and over time, however, exact solution is often impossible. In this volume we have emphasized the use of computer-assisted simulation as one method to derive approximate solutions to complex theories where other methods are insufficient to the task.

But should theories in the social sciences be so complex that we must resort to such approximate methods for understanding them? Simplicity and generality are, of course, to be greatly desired in social science theory. The very simple theories in the first and second parts of this volume are capable of describing the dynamics of very wide ranges of important economic, political, and cultural phenomena—and are often quite comprehensible by deduction and/or direct solution. But, in dealing with social dynamics in even very simplified and abstracted ways, the complexity of our theories can rapidly get out of hand. The exercises in the third section of this volume are both extremely simple models and of sufficient complexity to be explicable only by formal methods.

It is not the intent of this volume to suggest that social scientist's theories strive for greater complexity as an end in itself. But, as the

concepts of “general systems” and “complexity” used in this volume suggest, even many quite “simple” social dynamics are too complicated to understand fully without assistance. Computer-assisted simulation in “theoretical research” can be understood as a research tool—one of several—that can and should be used to explicate and analyze our own theories. Social science theorists should not deliberately seek to create complicated theories, but neither should they shy away from them when they are necessary. Hopefully this volume has contributed to theorists’ tool kits as they undertake these tasks.

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