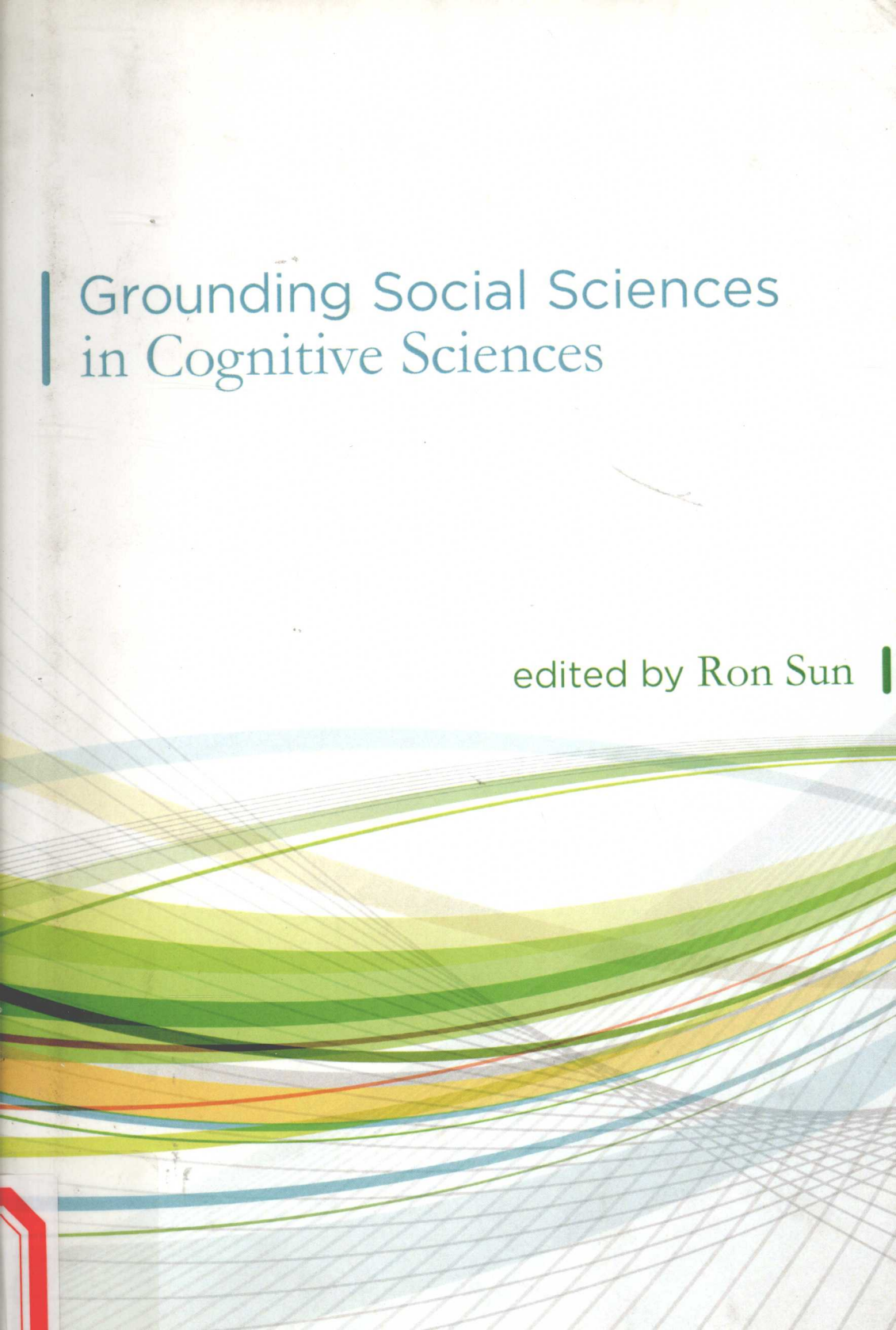
Grounding Social Sciences in Cognitive Sciences

edited by Ron Sun



GROUNDING SOCIAL SCIENCES IN COGNITIVE SCIENCES

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Preface

This book explores the cognitive (psychological) basis of the social sciences and the possibilities of grounding the social sciences in the cognitive sciences, broadly defined. The result is what I call cognitive social sciences (or cognitively based social sciences)—an integrative intellectual enterprise.

The cognitive sciences have made tremendous strides in recent decades. In particular, computational cognitive modeling (computational psychology) has changed the ways in which cognition and psychology are explored and understood in many profound respects. There have been many theoretical or computational models proposed in the cognitive sciences, leading to detailed understanding of many cognitive or psychological domains and functionalities. Empirical research has also progressed to provide a much better understanding of many psychological phenomena.

Given the advances in the cognitive sciences, can we leverage these successes for the sake of better understanding social processes and phenomena? More fundamentally, can the cognitive sciences (including computational psychology, experimental cognitive psychology, social-personality psychology, developmental psychology, psycholinguistics, philosophy of mind, cognitive neuroscience, and so on) provide a better foundation for important disciplines of the social sciences (sociology, anthropology, economics, political science, and so on)?

Thus far, although it is still very much neglected, there have been various efforts at exploring this topic. Some of the efforts have been computationally motivated. Others are more empirical or theoretical in nature. The present volume includes some of the major work in all of these directions, written by some of the best experts in various fields of the social sciences and the cognitive sciences.

The focus of this book is the unification of the social and cognitive sciences through "grounding" of the social sciences in the cognitive sciences,

broadly construed and broadly inclusive. This book is not limited to computational approaches, or to any other specific methodology. It includes chapters on a range of topics, selected to capture issues in a wide selection of social science fields. Thus, for example, someone from behavioral economics could pick up the book to see what related work is being done in other social science fields. To achieve a proper balance between breadth and depth, each chapter aims to combine the rigor and depth of a research article with the breadth and appeal of a handbook chapter.

A summary of the key features of this book is as follows:

- A unique agenda: the broad exploration of the "grounding" of the social sciences in the cognitive sciences is unique and relevant.
- A comprehensive scope: this book is broader in scope than any other book on this or similar topics (possibly pointing to a new general direction for the social sciences as a whole).
- Multiple approaches: the book includes multiple approaches and perspectives, either theoretical, experimental, or computational, which may compete with or complement each other.
- Interdisciplinary interaction: the goal of the book includes the facilitation of the interaction of many relevant disciplines, including cognitive psychology, social-personality psychology, computational psychology, sociology, anthropology, economics, political science, philosophy, artificial intelligence, and so on.

The readership of this book may include academic researchers and graduate students in fields ranging from sociology, economics, political science, and anthropology, to cognitive psychology, cognitive modeling, and social psychology, and even further to artificial intelligence and philosophy. In particular, I have in mind readers from a social sciences background who are interested in incorporating the considerations of human cognition or psychology into their studies, as well as readers from a cognitive or psychological background who are interested in tackling social issues from cognitive or psychological viewpoints. In addition, the book may be of interest to policy makers and other practitioners, as well as to laypersons interested in the aforementioned directions.

The book may be suitable for graduate-level courses and seminars on this topic, but may also be extended to the advanced undergraduate level.

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1 INTRODUCTION

1 Prolegomena to Cognitive Social Sciences

Ron Sun

1.1 Something Missing

On a chilly autumn day in 2001, I walked through the broad sidewalks of the strangely quiet streets of Chicago in the early morning, a then unfamiliar city to me, to get to a meeting on "new approaches to the social sciences." With an eager anticipation of being enlightened, I rushed through the ten-minute walk and arrived early at the grand and equally strangely quiet granite-clad University of Chicago Business School building in downtown Chicago for the meeting.

Sitting in the audience with the expectation of being intellectually stimulated, I soon discovered that something important was missing. The longer I sat there, the more I felt that way. This idea was gnawing at me.

What I was feeling missing from this otherwise interesting meeting was a particular type of explanation of social processes and phenomena—what I considered to be a fundamental type of explanation for social processes and phenomena. This type of explanation may be termed *psychological explanation* or *cognitive explanation* (in the broadest sense of the word *cognitive*). I prefer to refer to it as *cognitive explanation*, in recognition of the fact that many disciplines concerned with the human mind have come to be known, collectively, as the *cognitive sciences* (notice the plural form here). (I often would use *cognition-psychology* as a single term to highlight the inseparable nature of these two.)

In the evening, back in my hotel room, I continued my rumination. Looking out onto a 180-degree view from the floor-to-ceiling, wrap-around window of the corner room in the high-rise hotel, I could see a panorama of the city with its neon signs and flickering lights. I wondered whether it was indeed possible to explain a substantial part of social processes and phenomena from a cognitive-psychological point of view, whether correspondingly agent-based social simulation could be made more

psychologically realistic, and whether the social sciences could thus be put on a more solid footing that was more "scientific" (but not necessarily more mathematical) in some way.

Evolutionary explanations have been popular in many segments of the scientific community, but they tend sometimes to provide only unverifiable "just so" stories. Mathematical models such as game theory are useful and well respected, but they are often too normative and fail to take into account real-world complexity. The social sciences are broad-ranging, varied, interesting, and stimulating, but they are also often chaotic and confusing. How do we make sense out of this chaotic, exciting scene?

1.2 Why Cognitive Sciences Are Needed

By any measure, the cognitive sciences (including computational psychology, experimental psychology, linguistics, cognitive neuroscience, and so on) have made tremendous strides in recent decades. In particular, computational cognitive modeling (i.e., computational psychology; see, e.g., Sun, 2008) has changed the ways in which cognition-psychology is explored and understood in many profound respects.

For example, there have been many detailed models of cognition-psychology proposed in the cognitive sciences (broadly defined, as mentioned above), leading to more in-depth, more mechanistic, and more process-based understanding of cognitive-psychological domains and functionalities. Empirical psychological research has also progressed to provide us with a better understanding of many phenomena, from "pure" cognition to social cognition and beyond.

Given such advances in the cognitive sciences, the question now is: can we leverage these successes for the sake of better understanding social processes and phenomena? More fundamentally, can the cognitive sciences provide a better foundation for important disciplines of the social sciences (e.g., sociology, anthropology, economics, political science, communication, as well as some more "humanity" related fields such as history, ethics, religion, law, literature, and so on)?

Thus far, although very much a neglected topic, there nevertheless have been various efforts at exploring this topic. Some of the efforts were computationally motivated; see, for example, *Cognition and Multi-Agent Interaction* (Sun, 2006). Other efforts were more empirical or theoretical in nature; see, for example, *Cognitive Dimensions of Social Science* (Turner, 2001).

Evidently, there are both theoretical and practical rationales for the establishment and development of "cognitive social sciences." Any social

process occurs through the actions and therefore the minds of the individuals involved (DiMaggio, 1997; Turner, 2001; Sun, 2001, 2006). Whether in a specific context it is a deciding factor or not, taking cognition-psychology into serious consideration would be a reasonable step in trying to reach an in-depth, fundamental understanding of social phenomena. Some cognitive-psychological process details may turn out to be unimportant for a particular phenomenon, but this possibility cannot and should not be determined and declared a priori. Instead, it needs to be ascertained through empirical and theoretical work examining all factors involved, cognitive-psychological factors included.

To look at the issue in another way: the cognitive sciences may serve as a basis for the social sciences, in much the same way that physics provides grounding for chemistry or quantum mechanics provides grounding for classical mechanics. Social, political, and cultural forces, although perhaps "emergent" (as often claimed), act both *upon* individual minds and *through* individual minds. In that sense, minds, however complex or simple one conceives them to be, are the basis of social processes and phenomena. Macro-micro (social-psychological) interactions thus do exist and need to be understood. These two types of forces (macro and micro) interact with each other, giving rise to complex sociocultural and cognitive-psychological phenomena (e.g., Tetlock & Goldgeier, 2000; Sun, 2006).

The social sciences are facing their share of challenges, in terms of making significant breakthroughs, becoming more rigorous, connecting better with the physical sciences, and so on (see, e.g., chapter 14 by Mathew McCubbins and Mark Turner in this book). I would contend that the social sciences might find their future in the cognitive sciences, at least in part, which may well lead to a powerful, productive, and unified intellectual enterprise. Such a unification, or grounding as I called it (Sun, 2006, 2010), may provide the social sciences with imaginative research programs, novel paradigms and frameworks, new syntheses, hybridization, and integration, and so on, in addition to providing the cognitive sciences with new data sources and problems to account for.

Some sociologists (such as cognitive sociologists) and anthropologists (such as psychological and cognitive anthropologists), as well as social and cultural psychologists have been interested in socioculturally shaped cognition. That is, they are interested in how culture and social processes shape individuals' minds (see, e.g., Zerubavel, 1997; Cerulo, 2002; D'Andrade & Strauss, 1992). The other side of this equation—how cognition (human psychology) shapes, substantiates, and grounds social institutions, social structures, social processes, and culture—is largely underexplored

(of course, with exceptions as always; see, e.g., Sperber, 1996). The fact that this issue has been underexplored makes it even more important a candidate for serious examination, in both theoretical and empirical ways.

Looking into the future, one can easily see how the understanding of human cognition-psychology and its relation to sociocultural processes may lead to better understanding of a wide range of important issues in the social sciences, ranging from religion and international relations to politics and economics (e.g., see the chapters on these topics in the current volume). These issues are important not only for academics, but also for policy makers and practitioners in many different fields. There have been some promising signs already from the nascent field of cognitive social sciences, as described by various chapters in this book. I will get back to the topics discussed in these chapters a little later. For now, let us look into a broad framework first, which justifies the aforementioned "grounding" (integration/unification).

1.3 Levels of Analysis and Links across Levels

As discussed in Sun (2006), one interesting but unfortunate characteristic of the current social and cognitive sciences is a relative lack of interaction and integration among disciplines (the kinds of collaboration reported in this volume are relatively rare). Each discipline tends to consider a particular aspect and more or less ignore the rest. They generally do not work together (although there have been calls for cooperation; see, e.g., chapter 15 by Herbert Gintis).

Instead of adhering to this relative isolation of disciplines from one another, we may adopt a broader perspective. For one thing, we may take a look at multiple levels of analysis. As we will see, these levels of analysis in the social sciences can be cast as a set of related disciplines, from the most macroscopic to the most microscopic. These different levels include the *sociological*, *psychological*, *componential*, and *physiological* levels. In other words, as has been argued in Sun, Coward, and Zenzen (2005) and Sun (2006), we may view certain different disciplines as different levels of abstraction for exploring essentially the same broad set of theoretical questions (with different emphases, of course).

The *sociological level* includes sociocultural processes, social institutions, structures, organizations, and inter-agent interactions, as well as interactions between agents and their sociocultural environments. These issues have been studied by sociology, anthropology, political science, and economics.

Next is the *psychological level*, which covers individual behaviors as well as concepts, beliefs, knowledge, and skills employed by individuals. Between this and the sociological level, the relationship of individual concepts, beliefs, knowledge, and skills with those of the society and culture, and the processes of change of these, independent of or in relation to those of society and culture, may be investigated.[1] This level examines human behavioral data, comparing them with models and with insights and constraints from the sociological level and more detailed information from the lower levels.

The third level is the *componential level*. This level attempts to understand the mind in terms of its components, applying the language of a particular theoretical paradigm. This level may involve conceptual, computational, and/or mathematical structural specifications, such as specifying computationally an overall architecture of the mind and the components therein (e.g., Newell, 1990; Sun, 2002). Essential processes within each component as well as essential connections among components may also be specified. Constructs and data from the psychological level—that is, the psychological constraints from above, which bear on the division of components and the processes within components—are among the considerations. This level may also incorporate biological and physiological notions regarding divisions; that is, it can incorporate constraints and ideas from the level below. This level results in mechanisms, though they may be computational-mathematical and thus somewhat abstract compared with the physiological level.

Although the componential level is essentially about intra-agent processes, conceptual, computational, or mathematical models developed therein may be used to capture processes occurring at higher levels, including interactions at the sociological level that involve multiple individuals (Sun, 2006). That is, we may construct agent models from a sub-agent level (the componential level), but go up from there to the psychological and sociological levels. For example, the CLARION cognitive architecture model specifies component mechanisms and processes and their interactions, and then moves up to higher levels to account for psychological and sociological data (Sun, 2002).[2]

The lowest level of analysis is the *physiological level*, which refers to the biological substrate (the biological implementation) of the mind's computation. This level has been the focus of a range of disciplines. Biological substrates may provide useful inputs as to what kind of computation is likely at a higher level and what a plausible architecture at a higher level should be like. Thus the utility of this level includes facilitating analysis

at higher levels, using lower-level information to narrow down choices in determining the overall architecture as well as choices in describing componential processes.

Although theoretical or empirical work is often limited to within a particular level, this need not be the case: cross-level and mixed-level analysis and modeling could be enlightening, and might even be crucial (Sun, Coward, and Zenzen, 2005; Sun, 2006). These levels, as proposed above, do interact with each other (e.g., by constraining each other or grounding each other; more on this below) and may not be easily isolated and tackled alone. Moreover, their respective territories often lack clear-cut boundaries.

Normally, theories begin with the specification of units of analysis within a specific level, such as the sociological level. Theories that cross or mix levels subdivide such units and therefore may prompt deeper explorations (e.g., cognitive analysis of sociological issues). In relation to the theme of the present book, crossing and mixing levels of analysis constitutes the meta-theoretical foundation of cognitive social sciences, the integration of the cognitive and social sciences, which will be explicated in more detail below.

A key theoretical issue in this regard is the micro-macro link between society and individuals (see, e.g., Alexander, Giesen, Munch, & Smelser, 1987; Sawyer, 2003; Sun, 2001) or, more specifically, the micro-macro link between the social and the cognitive-psychological, crossing the first two levels (or more). The general questions regarding the micro-macro link are as follows: how do individuals affect collective processes and phenomena, and how do collective processes in turn affect individuals? In order to explore the questions at a sufficient depth, it is necessary to delve into individual cognition-psychology, because the cognitive-psychological processes of individuals are presumably the most important factors at the micro level. (Of course, one may choose to believe that individuals are just puppets of inescapable social forces, but in that case there is, practically speaking, no longer a question of the micro-macro link.) Hence crossing and mixing the sociological and psychological levels (as well as possibly other levels) is the prerequisite for a better understanding of social processes and phenomena (from the standpoint of the micro-macro link), as argued in the previous section.

Another key theoretical issue in this regard is downward versus upward causation across levels. This issue has been controversial (see, e.g., Wimsatt, 1997). In the present context, upward causation refers to influences from the micro to the macro (from individuals to society), and downward causa-

tion refers to influences from the macro to the micro (society to individuals). The precise nature of these two directions of causation, however, may be murky. For example, it is unclear whether downward causation from a macro state is supervenient on causation within micro states and, if so, whether it is meaningful to separate out downward causation (see, e.g., Kim, 2006; Craver & Bechtel, 2007). I will discuss this issue later in relation to the nature of cognition-psychology specifically (as opposed to pure philosophical argumentation).

The following sections look into specific cases of crossing and mixing levels with regard to analyzing sociocultural and psychological phenomena, while keeping in mind both upward and downward causation.

1.4 Grounding of Culture in Psychological Processes

We may first examine the relationship between culture and individual. In particular, the influence from culture to the cognitive-psychological, an instance of downward causation, has been emphasized in the literature in recent decades (e.g., Zerubavel, 1997; Shore, 1998; see also chapter 4 by Bradd Shore in this volume). However, in this relationship, besides downward causation, we also need to examine the importance of the cognitive-psychological to culture. Geertz (1973) claimed, "We are, in sum, incomplete or unfinished animals who finish or complete ourselves through culture." But, apparently—at least to some extent, and possibly to a very large extent—culture must function *through* the cognitive-psychological.

It seems fairly straightforward that culture is, at least in part, based on our innate cognitive-psychological capabilities and tendencies. As Richerson and Boyd (2005) argued:

> Culture causes people to do many weird and wonderful things. Nonetheless, the equipment in human brains, the hormone-producing glands, and the nature of our bodies play a fundamental role in how we learn and why we prefer some [cultural] ideas to others. Culture is taught by motivated human teachers, acquired by motivated learners, and stored and manipulated in human brains. Culture is an evolving product of populations of human brains, brains that have been shaped by natural selection to learn and manage culture.

Chapter 10 (by Harvey Whitehouse) in the present book makes similar points about evolved psychology and culture.

As an example of this point, naive sociological classification reveals the relationship between cognitive capabilities and cultural categories (Sperber & Hirschfeld, 1999). Children tend to attend to surface differences in forming categories and interpret these categories in terms of these