Updating Our Knowledge of Reasoning in the 20th Century

Review by
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I n 1980, Richard Nisbett and Lee Ross published their seminal (and controversial) book, *Human Inference: Strategies and Shortcomings of Social Judgment.* It documented the cognitive processes by which people produce inferences and judgments of various types and highlighted how these processes are subject to error and bias. *Rules for Reasoning* looks at the other side of the reasoning coin—it focuses on people's ability to reason in a number of different ways (inductively, deductively, causally, statistically) across a wide range of situations. Whereas *Human Inference* was occasionally attacked (we think unfairly) as presenting an overly pessimistic view of human reasoning capabilities, *Rules for Reasoning* will be controversial for its optimistic view of people's ability to learn and use abstract reasoning principles. The overall tone of *Rules for Reasoning* emerges early in Chapter 1:

People have intuitive versions of these formal rule systems that they apply to at least some problems in everyday life. We know this because they solve problems that require use of the rule systems, because they articulate the rule systems in justifying their solutions, and because instruction in the rule systems increases the correct solution of the problems. (p. 6)

Rules for Reasoning may be seen by some readers as a contradiction and repudiation of *Human Inference* and the bias and error literature. Nothing could be further from the truth. The ideas and research presented in *Rules for Reasoning* are first cousins to earlier work on biases and errors in human judgment. The bias and error literature first asks the broad question, How do people make complex judgments and decisions? and then uses the specific question, What conditions lead to error and bias in judgment? as a heuristic tool to discover an-

swers to that broader question. The ideas and research behind *Rules for Reasoning* start with this same broad question but use a very different specific question, What conditions promote the effective use of reasonable rules of inference? to learn more about how people make complex judgments and decisions.

The optimistic tone of *Rules for Reasoning* is not a sufficient criterion on which to base an overall judgment, of course. Such a compendium of empirically based work is best judged by assessing the importance of the goals of the book and by assessing the extent to which those goals are met. The introductory chapter outlines a worthy set of goals, which we present in the form of five interrelated questions. The first question raised is whether the Piagetian and American psychological traditions are mistaken in their assumption that one cannot teach abstract rules of reasoning. The second question raised is, "What if you actually could teach people highly abstract rules of reasoning—and even do so by highly abstract and therefore efficient means?" (p. 3). The third question raised is one of applicability, namely, Can instruction on rules of reasoning lead to successful application of the rules across a full range of relevant problems in everyday life? The fourth and fifth questions are related to possible implications given that the answers to the first, second, and third questions regarding the use of abstract rules of reasoning may be answered optimistically and in the affirmative—namely, how would people think of the human mind and how would people then think about education? Our first criterion, concerning the importance of the goals, is thus well satisfied. These goals target important philosophical, theoretical, and practical questions.

To address the questions, editor Nisbett assembled and organized a collection of 12 empirical journal articles published between 1983 and 1992. Three additional original chapters provide coherence and continuity to the main ideas in the original articles. The articles themselves represent a collection of research conducted over the last decade by Nisbett and his colleagues. For those scholars and psychologists who have already read the articles in their original published form, it is already clear that the research represented is of high quality in all cases. For psychologists and scholars not familiar with the research, the book *Rules for Reasoning* presents an excellent opportunity to examine the research within the broader context of attempting to answer

these important philosophical, theoretical, and empirical questions.

Nisbett has marshalled considerable empirical evidence to bear upon those questions and has brought our understanding of reasoning up-to-date with sound theory and solid research. The book approaches the questions in sections, with Part 1 establishing the existence of general rules for reasoning, which seems to be an appropriate starting point, as the existence of such rules has been questioned over the years by a number of psychologists and others (e.g., psycholinguists). Part 2 explores the possibility of teaching statistical reasoning rules and therefore improving performance on problems in which application of such rules would be of use. Parts 3, 4, and 5 focus on rules for conditional reasoning, causal reasoning, and rules for choice, respectively. Each of these sections is quite thorough, exploring both the specific type of rule and the possibilities for teaching those rules. Finally, Part 6 deals directly with implications for education, and Part 7 with implications for cognitive science. It is our opinion that these sections do an admirable job of addressing the important questions raised earlier. Thus, our second criterion is also well satisfied.

The final chapter of the book, Chapter 15, titled "The Case for Rules in Reasoning," deserves some special attention. It is noteworthy because it does an excellent job of (a) taking material presented in the earlier chapters and drawing conclusions based on a substantial body of empirical evidence and (b) synthesizing the evidence to provide insightful implications for the field of cognitive science. Perhaps more important, the last chapter presents and defends eight different criteria for rule use that were derived from psycholinguistics, performance measures, and training procedures. For each criterion, a rationale is provided for its inclusion, and specific empirical evidence that bears upon the criterion is reviewed. Finally, this chapter explores the possibility of two kinds of rule use, one explicit and one implicit, and also explores the implications of the current knowledge of rules for reasoning for connectionist models of cognition (which is a currently dominant cognitive model). Thus, the final chapter of the book is as hard-hitting as the Introduction and everything that can be found in between.

Though this book is by no means easy reading, due to the sometimes complex empirical content, it is well written and informative. *Rules for Reasoning* will appeal to a wide range of people, including cognitive and social psychologists, educational psychologists, educators at most school levels, and university instructors. Indeed, one of us plans to recommend it to his co-members of a university task force on assessment to illustrate the points that some aspects of college education produce broadly applicable improvements in reasoning and that such improvements are measurable. This book will also make an excellent text for use in a graduate course on reasoning or as a set of supplemental readings for such a course. The book brings the state of knowledge on reasoning into the 20th century and explodes a number of previously predominant myths, assumptions, and positions taken over the years within psychology. A statement made in the attention grabbing Introduction of this book seems to be a good way to summarize many of the findings and their implications:

The upshot of these findings is that modern cognitive science and modern educational theory must accommodate themselves to the existence of abstract inferential rules. Psychological theories that hold that there are no rules, or no domain-independent rules, for problem solving, are not tenable in the light of the work presented in this book. Educational positions that emphasize self-discovery and maturation must make room for the generalization that abstract techniques of instruction can be very powerful. (p. 7)

Any professional interested in how people reason will want to read this book. It is packed with information that will appeal to a broad audience and does an excellent job of taking basic science psychology research and applying it to an important domain, namely education. Also important is the fact that the book contains plenty of optimism to go around; that commodity is all too frequently lacking in current discussions of higher education.

Reference

Nisbett, R., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment.* Englewood Cliffs, NJ: Prentice Hall.

Linking Creativity With Problem Definition

John F. Wakefield
Creative Thinking: Problem-Solving Skills and the Arts Orientation
Norwood, NJ: Ablex, 1992. 123 pp.
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Review by
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John F. Wakefield, professor in the Department of Secondary Education at the University of North Alabama (Florence), is author of the chapter "Problem Finding and Empathy in Art" in the forthcoming M. A. Runco (Ed.) Problem Finding, Problem Solving, and Creativity. ■ Stanely S. Gryskiewicz, Senior Fellow in Creativity and Innovation at the Center for Creative Leadership (Greensboro, North Carolina), is editor of a volume of collected papers on theory, research, and applications of innovation and was instrumental in bringing the sixth annual International Creativity and Innovation Networking Conference to the United States in 1992. Gryskiewicz has worked with the Plekhanov Institute in Russia and the Japan Management Association, among others, and his clients include such companies as Pfizer International, Merrill Lynch, and IBM.

Wakefield has taken a step to reduce the mystery associated with creativity by linking artistic career orientation with a new look at problem definition. Although it is reasonably accepted that artists solve problems, there has been need for a developmental explanation of how problems are noticed, defined, and finally solved. The author offers a series of research findings that trace the development of cognitive skills and abilities in age groups of 11, 14, and 18 year olds and a fourth group in their early twenties. The link to intrinsic motivation and solv-