

The Oxford handbook of computational and mathematical psychology

By Jerome Busemeyer, Zheng Wang, James Townsend & Ami Eidels (Eds.)

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It is getting harder and harder to describe psychology as a soft science! My background is in engineering and mathematics, and my involvement in psychology has been on the technical side of fMRI. Along with fMRI, an increasing number of 'high-tech' methods are being used to collect hard data to test scientific hypotheses and models in psychology. As *The Oxford Handbook of Computational and Mathematical Psychology* clearly reveals, it is not just with the production of hard data that psychology is becoming a hard science. Current mathematical models rival those used in biology, chemistry, and physics in terms of sophistication and complexity.

When I was a student, the overview of science was that psychology was really biology, and biology was really chemistry, and chemistry was really physics, and physics was really mathematics, and mathematics was impossible! Neurobiology is a big component of psychology, but non-trivial mathematical models of psychology, of the mind, now exist on their own ground independent of detailed biological models. This point, to me, is clearest when you examine the book from back to front. The last chapter is on the application of quantum probability theory to psychology. I understand quantum mechanics as it is applied to physics. But it is a puzzle as to why physics follows quantum mechanical rules. Reading through the last chapter, I began to form a glimmer of the answer to that 'why', by thinking about the interference terms that arise from quantum calculations. The issue is not explicitly addressed by Busemeyer, Wang, and Pothos in that last chapter, but the point that psychology seems to bring to the game is that there is an inside and an outside. There is an inner component to our thinking that appears to come before the decisions are made in the decision/gambling experiments reviewed in that chapter. Analogously, there should be an inside and an outside to physics, and if you think about it, there is. The inside of physics is represented by sums over histories and virtual particles. How, then, might we think about the inside of the mind?

Reviewing the book from front to back, the introductory chapter (one of 14 chapters) starts with an overview of relevant mathematics from high school level through some basic calculus and probability theory. It is impossible to cover everything one might need, but an overview of linear algebra, used in many of the book's chapters, is noticeably missing. Also, there is a curious choice of half-cycle angular units for the trigonometry review. After that, the book is divided into four parts aimed at different areas of psychological investigation. Those areas are as follows: Elementary Cognitive Mechanisms (Part I); Basic Cognitive Skills (Part II); Higher Level Cognition (Part III); and New Directions (Part IV). These areas weave their way from more traditional psychological investigation – particularly studies based on response time experiments – through to more sophisticated modern investigations. Many of the reviewed topics have connections to areas that have informed computer scientists and engineers on how to build machines that mimic, and improve upon, human behaviour. As an outsider, I appreciated the historical review of response time experiments (Chapter 4 in the Elementary Cognitive Mechanisms part) and the development and categorization of temporal models of mental processing. In my work with fMRI, I was always a little uneasy at the seemingly ad hoc explanations given to explain experimental data. The concept of model mimicry should be one that every student of psychology is exposed to. There can be more than one way to explain data!

Those of us in the physical sciences (if I may speak for a large group of people) have always been impressed by the command that social scientists have with the statistical analysis of data. Sophisticated Bayesian approaches are presented as the basis of models of cognition (Chapter 9 in the Higher Level Cognition part) and model comparison (Chapters 13 and 14 in the New Directions part). I particularly liked the overviews of AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion) given in Chapter 14. I have seen these numbers used in connection with structural equation modelling but often as black-box numbers. Network-based models are also part of the toolkit. Networks show up in the book for models of decision-making (Chapter 10) and memory (Chapter 11) in the Higher Level Cognition part. There is enough review of statistical

methods throughout the book to allow an outsider – a collaborator – to become familiar with the statistical approaches experimental psychologists apply to their data.

Connections with neurobiology are given throughout the book with the most focused review given in Chapter 15 of the New Directions part. There is still a large gap between biophysical models of neurons, and cognition and behaviour. The work presented in this book will give a new researcher a good view of what has been done and where they might join in the work of filling in that gap. There is also still a pretty vague understanding of the connection between mind and brain. Studies that focus on the functioning of the mind in the possible absence of neurobiological considerations therefore have value. This is not a rally against reductionism but, instead, an appreciation of the value of new approaches. The last chapter on the application of quantum theory to the study of the mind, and not explicitly the brain, provides an optimistic, and exciting, view on where future research in the application of mathematical and computational models in psychology can go. There are new ways emerging of how to think about thinking, and *The Oxford Handbook of Computational and Mathematical Psychology* gives a nice overview of those new ways.

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The practice of collaborative counseling and psychotherapy: Developing skills in culturally mindful helping

By David A. Paré

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This book is a must-have for graduate student counsellors and for those teaching graduate-level classes in counselling skills. Paré, a practicing counsellor and university educator, has written a textbook that takes readers into the 21st century of the field of psychotherapy and counselling by emphasizing the inherently cross-cultural phenomenon of counselling and by inviting readers/counsellors to continuously reflect on the ethic of care that informs their work. Paré takes very complex ideas embedded from within discursive, narrative, and collaborative approaches to psychotherapy and makes them completely accessible to readers by staying away from post-structuralist jargon. In keeping with its accessibility, the book is written in a very applied, practical manner, which will appeal to both educators and trainees. For example, the book offers specific, contextual examples of therapeutic work, including session transcripts of two therapists and two clients that readers follow throughout the book. In addition, each chapter contains what is called, 'student voices': descriptions from students of their development as counsellors and psychotherapists in relation to the content being discussed. Finally, each chapter ends with discussion questions, hands-on exercises, and role plays that are designed to help bring the ideas alive in the classroom. Readers/counsellors of varied theoretical persuasions will experience this book as relevant and useful to practise.

There are five sections in the book containing 15 chapters and four appendices. The first nine chapters move progressively through foundational collaborative therapeutic skill building concepts and exercises. Throughout, readers/counsellors are encouraged to locate the problems that clients bring to therapy from within the broader contexts of their lives, rather than within them as individuals. Chapters 1–3 progress from learning the basics of counselling skills (e.g., preparing to practise; listening; receiving and responding to information; paraphrasing) to taking on more advanced skills – in chapters 4–9 – of collaboratively creating alliances in which clients' experiences can be mapped out according to challenges, preferences, and opportunities. Chapter 1, entitled 'Culture, Counseling and Care', is a beautifully written chapter that emphasizes the importance of appreciating the multiple cultural locations of both client and therapist, how divergent or similar locations may influence what is shared, and the position of care that effective therapists will assume

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