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Andrew Ortony , Gerald L. Clore , Allan Collins
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THE COGNITIVE STRUCTURE OF EMOTIONS

More than 30 years after its initial publication, this new edition of *The Cognitive Structure of Emotions* refines and updates Ortony, Clore, and Collins's OCC model of emotions. Starting from a three-way classification of construals of the world – events, the attribution of responsibility for events, and objects – the authors propose a systematic account of emotion differentiation. Rejecting the oft-favored features of bodily feelings, emotion-related behaviors, and facial expressions as too intensity dependent and insufficiently diagnostic, they provide a detailed analysis of emotion differentiation in terms of the cognitive underpinnings of emotion types. Using numerous examples, they explain how different variables influence emotion intensity, and show how emotions can be formalized for computational purposes. Now with a contributed chapter describing the influence of the OCC model, this book will interest a wide audience in cognitive, clinical, and social psychology, as well as in artificial intelligence and affective computing, and other cognitive science disciplines.

ANDREW ORTONY is Professor Emeritus of Psychology, Education, and Computer Science at Northwestern University. He is well known for his work on emotions and for his research on knowledge representation and metaphor, and edited two editions of the landmark book *Metaphor and Thought*. His awards include a James McKeen Cattell Sabbatical award, and a Fulbright Senior Specialist award.

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THE COGNITIVE STRUCTURE OF EMOTIONS

Second Edition

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To our wives,
Jelena, Judy, and Anne

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Preface to the Second Edition

We started working on the first edition of *The Cognitive Structure of Emotions* in the early 1980s, inspired by our belief that the emerging discipline of cognitive science was so taken with questions of knowledge representation and natural language processing that it was ignoring what for us appeared to be the obvious and important relation between affect and cognition. For us it was clear not only that affect influenced cognition, as we had been reminded in an influential paper by Gordon Bower in 1981 that discussed the effects of mood on memory and thinking, but also that cognition played a major role in the elicitation of emotions. This fact had already influenced some psychologists around that time, perhaps most notably, Richard Lazarus and colleagues (e.g., Lazarus et al., 1970), but such efforts had not permeated what was becoming "mainstream" cognitive science. Put simply, what the first edition did was to propose a theory of emotion based on a detailed analysis of how the content of our cognitions relate to how we feel. But in the spirit of cognitive science, it did one other thing – it attempted to spell out its proposals with sufficient precision and detail that it might be possible to employ them in computational models of what might be called "emotion information processing." And, so, although a psychological theory, many computer scientists interested in building such computational models adopted it as a starting point for building working computational systems, with the book and the theory it lays out often being referred to as (the) OCC (model) after our names, Ortony, Clore, and Collins.

Now, some thirty-five years after the publication of the first edition, the worlds of technology and of artificial intelligence are almost unrecognizable, and to some extent both influence and have been influenced by developments in emotion research. There are now all manner of computing domains for which emotion models are important. For example, social and domestic robots are beginning to have at least a rudimentary capacity to recognize, understand the significance of, and respond to the emotional states of the humans with whom they interact, and the same is true of virtual characters used in training and educational applications (so-called "serious games"), not to mention the simulation of plausible emotion-driven behaviors by the characters enjoyed by the nigh on three billion individuals worldwide whose gaming activities sustain the multi-billion-

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dollar gaming industry. Other areas of computer science to which some aspects of emotion theory are relevant include speech recognition and natural language processing, and the fast growing area of sentiment analysis and opinion mining. With all of these developments, it is perhaps not surprising that there has emerged a new subfield of computer science that focuses on computational methods of "understanding," simulating, and stimulating human emotion – a subfield of "affective computing" (Picard, 1997) with its own journal (*IEEE Transactions on Affective Computing*). Although to a lesser degree, there has also been influence in the other direction, with new technologies influencing emotion research. A clear indication of this is the emergence of the field of affective neuroscience (Panksepp, 1998), much of which uses sophisticated brain-imaging technologies to study the neural mechanisms underlying emotion processing. Furthermore, in addition to the increasing use of computational modeling of affective processes (Broekens et al., 2013; Reisenzein et al., 2013), the use of big data to explore various aspects of emotion is becoming more common (e.g. Cowen & Keltner, 2017; Jackson et al., 2019; Zhang et al., 2019).

At its core, OCC is a theory about the foundations of emotional experience. In this new edition we have updated our account by taking advantage of empirical developments since the book first appeared. In the first edition, we made some specific proposals about an issue that, at the time, was largely neglected by emotion theorists, namely, the question of the determinants of emotion intensity. In this new edition, we delve into the question of emotional intensity in much greater detail. A second important respect in which we have updated our original conceptions of the cognitive foundations of emotions is to integrate them with recent conceptual developments in emotion theory. The last thirty years have seen pressure (albeit often resisted) to abandon traditional, essentialist, ideas about emotion, in favor of a constructivist view (Gendron & L. F. Barrett, 2009; Russell, 2003) on which we believe that our own work has had a material influence. With this in mind, we have rejected our early way of thinking in terms of the *eliciting conditions* of emotions, with its implication that emotions are "things" waiting to be elicited when conditions are right, and replaced it with the notion of *emergence conditions*, which view emotions as being more akin to thoughts – emergent phenomena that are constructed, often unwittingly.

Other major changes, apart from significantly updating the literature that we cite (we have incorporated over 250 new references), include more detailed discussions of the relation between language and emotions, and a

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refinement of our proposed formalisms of a number of emotion types, and an increase in the number of emotion types that we characterize from twenty-two to twenty-four (a change that demonstrates that the theory can be readily modified). Finally, we were fortunate enough to be able to entice our renowned, computationally oriented, colleagues Jonathan Gratch and Stacy Marsella to write a final, contributed chapter reviewing the relation between the development of the field of affective computing and our own work. They, together with their students, are responsible for some of the most impressive computational models of emotion and coping processes to have been developed to date. It is hard to imagine two more appropriate people to undertake such a task, and we are most grateful to them.

Finally, we, the authors are often more pedantic than is good for us, a shared trait that surely made Irene Pizzie's task of copy-editing our manuscript quite a challenge. Thus to her, for her dedication, professionalism, and cheerful willingness to tolerate out foibles, we owe a special debt of gratitude. We would also like to thank Stephen Acerra, our editor at Cambridge University Press, for encouraging us to embark on this enterprise in the first place, and then overseeing it to the end. But the greatest contribution to this work has been made by our spouses who quietly and with ne'er a complaint accepted sometimes hours of neglect as we obsessively worked away, morning, noon, and night. Words cannot adequately express our gratitude to them. Nevertheless: Jelena Radulovic, Judy DeLoache, and Anne Collins, we thank you!

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Preface to the First Edition

As cognitive psychology established itself in the 1970s, it became increasingly apparent that it was a "cold" approach to cognition, and doubts began to arise as to whether or not it could provide the machinery necessary to account for affect and emotion. In 1981, Donald Norman identified the topic of emotion as one of twelve major challenges to cognitive science (D. Norman, 1981). It was at about this time that the three authors of this volume decided to collaborate in an attempt to explore the extent to which cognitive psychology could provide a viable foundation for the analysis of emotions. Certainly, it was no problem for cognitive psychology, with the help of schema theory, to explain such facts as that the same thing can be perceived from different perspectives. This was already encouraging, because the capacity to view a situation from different perspectives struck us as lying at the heart of the fact that different people often experience different emotions in response to the same objective event.

Many emotion theorists have argued that cognitive appraisal is central to emotion, yet no one has been able to say anything much more detailed than that. This book is an attempt to give at least the outlines of an account of how such appraisals are made. In it we present many detailed observations about specific emotions, their organization, and the specific cognitive processes involved in their elicitation, but we would be satisfied if this effort succeeded in demonstrating only that a systematic and comprehensive account of the cognitive antecedents of the emotions is possible. Our goal is to convince our readers that such an approach is viable rather than that our particular version of such an effort is the correct one. We have, in fact, chosen a somewhat arbitrary stopping point for this enterprise. Further use of the same structural principles that we propose would allow one to continue to specify increasingly differentiated sets of emotional states. The more one does this, however, the more one becomes tied to the emotional system associated with a particular cultural view of the world. This, in turn, increases the risk that one will lose sight of the main agenda, which is to characterize the range of "psychological" possibilities for emotions rather than to describe the emotions and emotion-related processes local to any specific time or cultural group.

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We started collaborating on this project in the spring of 1980 when we began talking to each other about various emotions and the conditions of their occurrence. In the context of our common fascination with this problem, the differences in our backgrounds and interests made the end product different than it otherwise would have been. As a group we include a cognitive scientist interested in psychological, linguistic, and computational aspects of the study of mental processes, a social psychologist with interests in personality and in the influences of affect on social judgment, and a cognitive psychologist with interests in the formal modeling of human reasoning processes. As we started working out some of the ideas into a more concrete form it became clear that we were going to end up with a book – a book that we began to think of affectionately as *Principia Pathematica*. We saw ourselves as attempting to characterize some of the key principles governing the cognitive mechanisms underlying human emotions, so that title seemed to us apt and even a little humorous. After all, we tried to persuade ourselves, the *Oxford English Dictionary* contains the following (abbreviated) entry:

> PATHEMATIC, *a. rare* [ad. Gr. *pathematicos* liable to passions or emotions, f. *pathema* what one suffers, suffering emotion, f. stem *path-:* see PATHETIC] Pertaining to the passions or emotions; caused or characterized by emotion.

However, many of our friends and colleagues were skeptical. The title we proposed would be incomprehensible to those lacking a classical education, they argued, and the book might well end up in the medical section of bookstores! Then again, there was the problem of hubris – was it not a little pretentious? We were eventually persuaded that discretion is the better part of valor, and settled on a title that, while maybe lacking something in panache, at least has the virtue of truth in advertising.

Thanks are due to a number of people and institutions for intellectual, financial, and moral support. In particular, we are grateful for the encouragement and helpful comments and observations of Bob Abelson, Gordon Bower, Jerry DeJong, Nico Frijda, Philip Johnson-Laird, George Mandler, George Miller, Robert Wilensky, and many colleagues at the University of Illinois at Urbana-Champaign, especially in Psychology. The ideas, criticism, enthusiasm, and hard work of the members of our research group, including Mark Foss, Terry Turner, Jerry Parrott, Steve Levine, and Susan Ravlin, were an indispensable aid to us. We also thank Katharita Lamoza of Cambridge University Press for her tireless effort as production editor of this book. Thanks are also due to the National Science Foundation for the

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resources in the form of a grant (BNS 83–18077) that enabled us to explore some of our ideas empirically as well as theoretically, that allowed all three of us to get together, and that kept the project moving. In addition, we would like to acknowledge the support provided to some of our pre- and postdoctoral students through a training grant from the National Institute of Mental Health (MH 15140). We also want to express our gratitude to the Center for Advanced Study at the University of Illinois for granting two of us fellowships in successive years that allowed us to devote significant portions of our time to completing this book. Most of all, however, we thank our wives for putting up with us during years of obsessive discussions.

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