or achievements with other people is central to the description of the social pathology of autism." (p. 325) From a clinical perspective he argues that improving the initiation of joint attention also improves social learning and provides the foundation for social-cognitive development.

Despite the fascinating subject matter and the elegance of the research, this volume was at times difficult to follow, perhaps suffering from the way it was developed. Some authors went to great lengths to define the context of their research (e.g. Gallagher Chapter 3) whereas others assumed understanding of that knowledge (e.g. Dunbar Chapter 1). For example the term "theory theory" referenced on p. 11 by Dunbar was not fully defined until Gallagher presented the context and literature around the term as it relates to Theory of Mind on p 49.

Infant social-cognitive development is multifaceted and requires the active participation of both infant and environment in ways that take advantage of the innate capacities of the infant and the responsiveness of the environment. This is an essential volume for anyone in the field of infant research and has immediate relevance for disorders on the Autism spectrum or other disorders for which social engagement is an important feature. It would have been somewhat less dense and easier to navigate had there been more careful editing (there were multiple typographical errors) and greater attention to redundancies and omissions chapter to chapter. However, the research is creative and elegant and the information is for the most part recent and compelling for both researchers and clinicians.

Decisions, Decisions…

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Neural Basis of Motivational and Cognitive Control, Rogier B. Mars, Jérôme Sallet, Matthew F.S. Rushworth, & Nick Yeung (Eds.). 2011. Cambridge, MA: The MIT Press, 449 pp., $52.00 (HB).

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Decision-making and questions about it are commonly addressed in neuropsychological practice. These questions often are about how people learn from experience, or more importantly, why consequences do not appear to change behaviors. Relatedly, impulsive behaviors can be extremely difficult to manage, whether these occur in the context of neurodevelopmental disorders, neuropsychiatric conditions, or neurological injuries and illnesses. Motivation or its lack also presents explanatory challenges, especially since defining antecedent or consequent motivators is a powerful tool for developing effective behavioral interventions.

For neuropsychologists, discussion of decision-making inevitably includes the brain-based underpinnings and behavioral principles that combine to produce outcomes. In a clinical setting, talking about these brain-behavior relationships often provides alternate explanations for actions that are otherwise impossible for patients and their families to explain. In turn, having these explanations can help improve behavior and the relationships between patients and families. Explanations are always incomplete, however, because of the current state of our knowledge about executive functioning and the cortical-subcortical circuits that sustain it.

Neural Basis of Motivational and Cognitive Control, edited by Rogier Mars, Jérôme Sallet, Matthew Rushworth, and Nick Yeung is an excellent resource for any neuropsychologist's bookshelf. The editors invited contributions from researchers who were chosen to represent the multi-disciplinary nature of a June 2010 meeting in Oxford that was the latest in a series about the neural basis of learning and response selection. The volume has six sections that generally build on each other, starting with the basic neuroanatomy underlying cognitive control, continuing into more detailed reviews of the relevant cortical and subcortical systems, and then moving into a section that discusses individual differences. The final two sections of the book provide discussions of computational modeling as applied to reinforcement learning and the applications of neuroscience to increasingly related fields such as economics and social-decision-making.

The first section provides an important grounding for the reader through its detailed review of the neural structures that are relevant to decision-making in monkeys and humans. In addition to identifying key structures, the authors of this section stress connectivity, including the cortical-subcortical loops that contribute to the experience of reward. The section concludes with a discussion of the neurotransmitter systems involved in cognitive control. Overall, the concepts discussed in this section are well-known to neuropsychology, but these three chapters provided a firm foundation for the discussions that followed. New to this reader, this section introduced error-related negativity (ERN) and feedback-related negativity (FRN), electroencephalographic markers of performance monitoring that are key to understanding several later chapters on learning.

The next two sections further delineate the contributions of cortical and subcortical structures to cognitive control. These provide further evidence for the development of brain-based models of behavior and learning, as well as food for thought about the pathologies that arise when these networks break down. For example, the second section provides an explanation of how frontal cortex and cingulate cortices contribute to initial learning and subsequent behaviors by setting values

for the expected outcomes of the choices made for stimuli. This section also makes clear the importance of top-down control for actions and behavioral inhibition, as well as the key role that posterior cingulate cortex plays in adapting behavior to cope with a changing environment.

Of course, cortical contributions to learning and action control occur only in the context of cortical-subcortical circuits. The chapters in this section address the role of these circuits in developing instrumental behaviors, and also in generating the stop signals that often are central to more complex aspects of cognitive control. Building on the general discussion of neurotransmitters in the opening section, two of these chapters provide further explanations of the roles of the dopamine and norepinephrine systems that are generated within subcortical structures.

The next three sections were the most directly related to neuropsychological practice and also were conceptually complex, especially the discussions of computational modeling that constituted the fifth section. Readers will find a thoughtful discussion of the social decision-making network and its changes during adolescence. This discussion should inform clinical feedback when working with young clients because it shows how children and younger adolescents assign different values than adults to types of feedback. This section also covers research regarding individual differences seen during behavioral regulation and motivational tasks. These differences provide insights into how motivation affects self-regulation, and a model that helps explain the commonly seen trade-off between speed and accuracy.

The section on computational modeling brings forward the concepts of error-related negativity (ERN). There are two types of ERN, associated with incorrect responses or with incorrect feedback. In ways useful to any behavioral scientist, this section ties ERN back into a model of reinforcement learning (hierarchical reinforcement learning). This reinforcement learning model is then placed into the context of frontal-subcortical circuitry. The strength of these circuits influence responses to feedback and subsequent decision-making. Concluding this section is a model of inhibitory control that puts forth a useful explanation of why individuals with regulatory deficits often need stronger, more consistent signals about stopping or changing behaviors.

The final section of this volume extends the models of motivation and cognitive control to economics, and the economics of social decision-making. The latter chapter provides several hypotheses about brain areas in the social decision-making network and how these areas influence judgments about fairness and trust. This network also may influence the development of the "theory of mind" that is so important in social perspective-taking.

The editors' stated goal in *Neural Basis of Motivational and Cognitive Control* was to produce a work that would be useful to an "audience in all fields of research that deal with motivational and cognitive control." They have achieved that goal. This volume provides an exceedingly useful compilation of material that integrates up-to-date neuroscience knowledge with behavioral models. The only notable weakness of this work is that, because the contributing authors come from several different fields, chapters may contain slightly different terminology for the same concept. This often requires the reader to return to previous material to ensure understanding. Nevertheless, this book provides detailed information for conceptualizing and explaining cognitive control and decision-making processes. For readers who wish more information, each chapter provides a list of further readings separate from the reference section, as well as a list of questions to be answered by further research.