

ume brings the reader up to date in this rapidly developing field and provides the foundation for interpreting future work in this area. It should be of great interest to specialists in the area, schizophrenia researchers and their students.

Robert B. Zipursky, MD, FRCPC
Toronto, Ontario, Canada

Affective Minds. Hatano G, Okada N, Tanabe H, editors. Amsterdam: Elsevier Science; 2000. 283 pp with index. ISBN 0-444-50418-4 (cloth). US\$136.

Affective Minds is a collection of papers based on presentations given at the 13th Toyota Conference, Shizuoka, Japan, from Nov. 29 to Dec. 2, 1999. The Toyota Conference aims to contribute "to the growth and advancement of emerging fundamental science and technology" (p. xiii) by bringing together leading researchers for "intensive discussions [and] for an exchange of ideas" (p. xiii). Previous Toyota Conferences have focused on topics such as materials science, chaos theory, global environmental planning, and "Brain and Mind" (the 9th Toyota Conference, held in 1995).

This collection of papers will be of value to anyone interested in human emotions. Because the conference planners selected speakers from a diverse range of scientific fields, it is highly probable that every reader will find something new. The broad range of approaches will also stimulate readers to broaden their own perspectives and, as such, may foster improvement in research related to emotions. Such research, it is hoped, will ultimately lead to bet-

ter clinical care and also to improvements in a number of other fields (e.g., artificial intelligence). Nonresearchers should also find the book of interest. For example, clinicians may be interested in the diversity of approaches influencing clinical care. Such influences might include impacts on psychotherapeutic interventions, based on findings related to the self from a neurocognitive perspective (D.T. Stuss and M.P. Alexander, chapter 2) or cultural influences on affective communication (K. Ishii and S. Kitayama, chapter 25).

The diversity of approaches is also evident in the 3 keynote papers, which focus on emotion and social interactions, the anatomical basis of emotion and self-awareness, and attachment and goals. The remaining papers are organized into sections focusing on emotion and computation, brain damage and emotional problems, development and emotion, applications to artificial systems and emotion in society.

Although this diversity is one of the book's strengths, it also poses a challenge to the reader, as some of the papers are difficult to fully understand without at least some prior knowledge of the topic. Furthermore, the separation of the topics into individual papers and sections highlights another limitation of the book (and hence, perhaps, the conference it reports on). One of the goals of the conference organizing committee was to "unite seemingly very different disciplines" (p. v), but this goal is not fully realized by isolating topics as the book has done. A better unification of ideas would allow research in one discipline to better

enhance research in other disciplines. That this has not been occurring is evident, for example, in chapter 18 (A. Sloman and B. Logan). While discussing "virtual machine information processing architectures" (p. 170) the authors state their belief that "researchers and therapists who refer to 'executive function' in humans are often unaware that they are discussing mechanisms which (incorrectly) combine deliberative and meta-management approaches" (p. 173). This separation of the "self" from lower executive functions is in fact not unknown, but rather was proposed by Stuss (the coauthor of chapter 2) many years ago. Had Sloman and Logan been aware of Stuss's conceptual model, their research might well have been facilitated. Conversely, Sloman and Logan's findings are supportive of Stuss's model. Clearly, better integration of knowledge about emotions from diverse fields is crucial. Although this book represents one step toward this goal, it also remains evident that further efforts are required and that they are likely to be fruitful.

There is one other limitation of this book of which potential readers should be aware: many of the reported studies have significant methodologic limitations that tend not to be acknowledged in the papers.

Synopsis of chapters

Chapter 1 (M. Toda) proposes an evolutionary development of emotional systems and their role in human social behaviour. It suggests that emotions appropriate for wilderness survival still persist but are perhaps inappropriate for today's "extremely low status-

variance communities" (p. 12).

Chapter 2 (D.T. Stuss and M.P. Alexander) provides a review of research supporting a hierarchical model of neural operations that allows for the progressive integration of perception and cognition with emotion. The right frontal lobe is suggested to play a strong role in the highest level of the hierarchy, in which awareness of self (and as such one's own emotional state) are integrated with current perceptions, aspects of cognition (e.g., memory) and drive states, to allow the individual to make cognitive and behavioural decisions (and responses) that advance emotional and other needs.

Chapter 3 (M. Minsky): Persons to whom infants are attached are thought to have an ability to evoke more powerful emotions in the child (e.g., shame and pride evoked by imprimers versus disappointment and pleasure when imprimers are absent). These more powerful emotions, in turn, play a role in the learning of new goals. The process is facilitated by human infants' dependency on imprimers (which leads to a "downloading" of imprimers' goals).

Chapter 4 (R. Pfeifer) suggests that neural mechanisms underlying cognition and emotion are influenced by the "embodiment" of the individual. Embodiment includes the physical characteristics of the individual and his or her environment (e.g., body, gravity), as well as the person's informational system. Examples are taken from developments in artificial intelligence (e.g., robot technology) to suggest that understanding affective embodiment may help in understanding cognition.

Chapter 5 (D.C. Moffat and N.H.

Frijda) describes 3 computational models of emotion based on Frijda's theory of emotion (1986). The theory states that emotions are functional in that they have adaptive value for the organism. Emotions are thought to be "concern-activated response patterns which, depending on context evaluation, take control (precedence) in order to prepare the organism for a suitable change in action tendency" (p. 60).

Chapter 6 (T. Tsuchiya) proposes a computational model that considers emotions as a subjective value assigned to achieving goals, particularly under time constraints.

Chapter 7 (K. Binsted) suggests that emotional expression can be modelled (for entertainment purposes) on the basis of a set of structures, which include the type of emotion (e.g., happiness), intensity of emotion, target of emotion, cause of emotion and a decay function, all of which are influenced by the character's "static characteristics" (such as nationality).

Chapter 8 (D. Neary and J.S. Snowden) examines the affective, behavioural and cognitive roles of frontal brain systems as revealed by studying patients with frontotemporal dementia. Three syndromes are identified: an orbitofrontal system, dysfunction of which causes inappropriate affective responses, behavioural disinhibition and reduced sustained attention; a dorsolateral convexity system, dysfunction of which reduces affective responses and causes apathy and executive dysfunction; and the basal ganglia, dysfunction of which causes blunted and irritable affect, perse-

verative behaviour and cognitive slowing. The chapter also reviews work by A. Damasio, which involved 5 patients with lesions of the lower mesial frontal and orbitofrontal regions. Their sociopathic behaviour was linked to a lack of somatic response to socially relevant stimuli, despite intact cognition. A lack of affective response was thought to cause the inability to identify relevant social signals, which in turn altered behaviour.

Chapter 9 (T. Inoue et al) provides a comprehensive review of serotonergically active drug treatment of anxiety disorders, coupled with animal studies involving "conditional fear stress," in support of the hypothesis that facilitation of brain serotonergic activity, particularly in the medial prefrontal cortex, decreases anxiety.

Chapter 10 (K. Doya) suggests that considering "emotion as a meta-learning system enables a novel computational approach in which studies on learning theory, autonomous agents, and neuromodulatory systems can be bound together" (pp. 103-4).

Chapter 11 (M. Ikeda and E. Mori) describes an interesting naturalistic study involving outpatients with Alzheimer's disease living in the region of the 1995 Kobe earthquake. The earthquake was thought to be an affectively charged event relative to routinely performed magnetic resonance imaging (MRI). Patients recalled the earthquake (and related memories) much better than they did the MRI even up to 1 year later. Amygdaloid volume correlated with recall of the earthquake. These results suggest that affective charge improves episodic memory, and further that the amygdala

is crucial in this process.

Chapter 12 (S. Umeda and M. Kato) provides data obtained from patients with lesions of the ventromedial prefrontal cortex (VMPFC) by means of a false recognition paradigm and compares them with data from healthy controls. Results suggest that the VMPFC plays a role in social behaviour by mediating event-category judgement induced by receiving emotional signals and retrieving past similar events.

Chapter 13 (M. Lewis) explores the role of cognitive processes in the development of human emotions and proposes a model as follows. Infants are born with primary emotions such as joy and fear. At approximately age 1.5 years, children develop a sense of self, which allows development of new emotions, such as embarrassment, empathy and envy. In the third year of life, children develop a cognitive capacity, which allows them to understand expected standards, rules and goals. This allows development of the "self-conscious evaluative emotions" such as pride, shame and guilt.

Chapter 14 (P.L. Harris): By considering children's imaginative play, and adults' ability to experience emotions when involved in fictional drama, Harris proposes that "human beings are equipped with a tightly knit cluster of psychological capacities involving language, imagination and emotion." The interaction of these capacities is evolutionarily adaptive in that it allows humans to learn about the world "simply by being told about it" rather than having to experience everything. This "mental model activates the emotional system." This capacity may also be

important for planning; for example, we activate emotions in response to imagined courses of action, and these emotions guide our decision making.

Chapter 15 (Y. Uchida and S. Kitayama) suggests that emotional responses to and from others are to some extent driven by our evaluations of self. As well, the evaluation of self appears to be culturally dependent, with, for example, European and American cultures tending to maintain and enhance their self-esteem and Asian cultures tending to be more self-critical.

Chapter 16 (M. Hirai and K. Takahashi) suggests that in making decisions between individualism and collectivism (e.g., do I study for my exam or go out for dinner with my family?), emotional factors, such as degree of impact of decision on self (e.g., failing an exam versus changing one's lifestyle) and consideration of who the others are (e.g., non-family versus family) both contribute to the decision.

Chapter 17 (J. Grudin) develops Toda's work on emotions and social interaction by considering the evolution of social interaction in the electronic age. For example, email as a medium for "chatting" has many potential advantages, but also potential limitations (e.g., in direct human contact one may be aware of offending another and hence may act to correct it, but this may not occur via email, where the message "remains unchanged on the screen" [p. 165]). Since electronic communications are efficient, they will continue to spread quickly, but in doing so, they will pose risks to our emotional states.

Chapter 18 (A. Sloman and B.

Logan) explores information-processing architectures of virtual machines in the hope of explaining human mental phenomena, and proposes a complex system of information flow (from perception to processing to action), which is superimposed on "processing layers (from reactive to reasoning to meta-management, or "reflective," layers). These layers also reflect emotions. Also needed are "global alarm mechanisms" (to respond to urgent issues) and "extra mechanisms" to "support processing of motives" (e.g., attitudes, values, memories).

Chapter 19 (N. Tosa) suggests that art (e.g., plays, poems) can be analyzed to allow artificial intelligence systems to "delineate human emotions with deep insight," rather than only recognizing superficial human emotions, as is currently possible. This process, it is hoped, will ultimately lead to a "nonverbal" interface between humans and artificial intelligence which will allow humans to become much more "involved" in (or "fulfilled by") this technology (e.g., computer games).

Chapter 20 (H. Ushida et al) describes the development of an "artificial mind model for interactive agents" (such as robots and cyber agents). The proposed model incorporates emotions ("mind mechanism") to "resolve conflicts among several actions." The "consciousness mechanism" allocates resources by selecting attention, reacting and deliberating. Future work is proposed to include efforts in improving agents' learning and user evaluation of agents' emotions and personalities.

Chapter 21 (Y. Katagiri et al) reviews 2 experiments which sug-

gest that humans “respond as though computers were real humans” and that cultural norms affect this interaction.

Chapter 22 (J. Nicholson et al) develops a neural network system capable of recognizing 8 verbally expressed human emotions at a success rate of approximately 50%. Both phonetic and prosodic aspects of speech are used.

Chapter 23 (M. Tokuhisa et al) describes the early development of a system to recognize emotions in human dialogue via “emotion-tag annotation.”

Chapter 24 (T. Shibata et al) describes the development of animal

robots that seem to produce emotional responses in humans, in part, by their movements. These robots are thought to have potential therapeutic uses.

Chapter 25 (K. Ishii and S. Kitayama) summarizes a study that compares response times, as an indication of attentional processes, of Japanese and American subjects. The American subjects tended to focus more quickly on word meaning, whereas Japanese subjects devoted more attentional resources to prosodic aspects of speech. These results suggest the existence of cultural determinants in the communication of emotions.

Chapter 26 (G. Coricelli et al) begins to examine the impact of emotions on economic decision making by suggesting that humans tend to trust each other and, as such, derive economic advantage.

Chapter 27 (H. Matsushima) suggests that behaviour is affected by morals and provides mathematical proofs for various combinations of morality.

Chapter 28 (T. Nomura) suggests a need to consider emotions in understanding social phenomena.

Rob van Reekum, MD
Toronto, Ontario, Canada