discussed. However, they range through olive oil mill wastewater, pesticides, polycyclic aromatic hydrocarbons (PAHs), nitrogen, phosphorus, sulfur and boron relationships, and the effects of arsenates, copper, zinc, and cadmium on soil processes. The two final chapters in Part V (on rhizosphere processes) have little relation to the other chapters.

The book is clearly aimed principally at soil chemists, biologists, and environmental scientists as a reference source, rather than for general reading. It will certainly fulfill this role and find a useful place in most university libraries used by scientists and graduate students involved in these research areas.

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NEURAL SCIENCES

A MIND OF ITS OWN: HOW YOUR BRAIN DISTORTS AND DECEIVES.

By Cordelia Fine. Cambridge: Icon Books and Crows Nest, New South Wales (Australia): Allen and Unwin. £9.99. v + 199 p; ill.; index. ISBN: 1–84046–678–2. 2005.

If you think your brain is an objective processor of data about the world, capable of reaching objective, unbiased conclusions, think again. And if you want to really worry about it, then read this nicely written little booklet by Cordelia Fine, *A Mind of Its Own: How Your Brain Distorts and Deceives.* Our brain can be vain, emotional, deluded, pigheaded, secretive, and bigoted, all of which are words appearing in the chapter titles of Fine's volume.

For example, consider vanity. In an experiment with male college students (a psychologist's favored animal subjects), a group was told they had performed exceedingly well on a test for manual dexterity, while another was told they did pretty badly—except that the evaluations were assigned randomly to the two groups. When prompted for explanations, students who had to provide them immediately were at a bit of a loss, but those who had a few days to think about the experience had apparently managed to concoct all sorts of apparently logical (but, in fact, bogus) reasons for their performance. Seems that our brains are great storytellers indeed, especially about themselves.

Being emotional has a bad reputation, unless you like English movies set in the Victorian age, but in fact it turns out that emotions often come to our rescue. Another experiment reported by Fine concerns subjects who were asked to bet on different decks of cards, some of which were biased to occasionally yield high losses and others that were more benign. The statistical underpinning was too complex to be arrived at without actual numerical evaluations of the odds, and yet it turns out that subjects developed an intuitive feeling for the decks to avoid. Interestingly, the experimenters were able to show that the subjects responded emotionally (heightened skin conductance) to the bad decks even before they began to actually implement their intuitions about the game. It seems that an unconscious "fear of the bad deck" was the first response of the brain. Perhaps we should seriously entertain what our emotional intuitions tells us before dismissing them as "irrational."

A deluded brain, you say? Indeed, just consider another experiment in which people were asked a rather simple question: are you happy with your social life? Generally, subjects answer in the positive, and can provide "evidence" that this is in fact the case. But now ask the same question slightly differently: are you unhappy with your social life? Turns out that most respondents admit to unhappiness, and can as easily provide supporting evidence from their recent experiences. The possibilities for manipulating the public through polls and advertisements are endless and, of course, have been exploited for a long time.

Want to know how pigheaded your brain can be? Easily done, again through one of those cunning psychological experiments perpetrated by scientists who seem to derive an unholy degree of pleasure from showing the rest of us how embarrassing it can be to be human (as Kurt Vonnegut wrote in his novel, *Hocus Pocus*). For example, it is not particularly surprising that explicitly negative headlines in a newspaper will cast a shadow on someone's reputation. What is a bit more surprising is that an innuendo, say a title ending with a question mark, has a similar effect. And even more disturbingly, someone's reputation (and likelihood to, say, win an election) can be affected even by a positive headline, actually denying the reality of charges. Apparently, our pigheaded brains remember the part of the headline mentioning the charge, but not the little and yet crucial negation that accompanies the title of the article!

In what sense are human brains "secretive"? Fine briefly reviews evidence that poses the disquieting question of who or what really is in charge "up there." We are all familiar with the phenomenon by which repeated tasks that initially require our conscious attention (like driving) become more and more automated while control is delegated to unconscious processing. But the famous "tap your finger" experiment by Benjamin Libet is a window

into the possibility that we might routinely be much less in control than we think. Libet asked volunteers to spontaneously decide when to tap a finger, then measured what was going on in terms of electrical potentials inside their bodies and brains. Not only did he detect a "readiness potential" (i.e., increased activity in the brain before the muscles were actually activated), but he measured that such potentials occurred about one-third of a second before the volunteers were aware of their decision to move the finger! Apparently, the decision to engage in the action came from somewhere in the unconscious of the brain, and was made apparent to the conscious after the causal chain eventually leading to the action itself had already started. Again, who is in charge here?

If all of this has not convinced you to question your brain's motives and reliability, the final chapter of Fine's book deals with bigotry, and how difficult it is to get rid of. Studies show that if one "primes" the brain (i.e., uses words or symbols connected to a particular concept, such as mother or race) with neutral words, the effect is different depending on whether one is prejudiced on that particular issue or not. So, for example, a racist primed with neutral words about black people will react negatively, while a nonracist will not. However, if the priming is done with negative words, or if the subject is tired, then even nonracists are subject to accept racial prejudices. This goes a long way toward explaining how difficult it is to maintain nonbiased opinions when under a barrage of emotionally charged messages in the media, and presumably also while we are stressed, or simply tired, by our own daily affairs. Moreover, psychologists have discovered that willpower is in very limited supply, so that if you spend a lot of mental energy, say, avoiding overeating and trying to follow a healthy lifestyle, your guard may be too low to protect yourself against ideological assaults that would require a fresh and vigilant mind to be detected. Not a pretty tradeoff, if you ask me.

The author's message is not that we should not trust our brains—after all, we have no choice! Rather, the idea is that by knowing about our natural tendencies toward biased thinking we will be better able to maintain a healthy dose of skepticism about ourselves and others. The brain is the most crucial of our organs, pity that most of us do not bother to read even a short and sensible manual for its proper care and usage.

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The Mind As a Scientific Object: Between Brain and Culture. *Based on conference held in Toronto, Canada, 1996.*

Edited by Christina E Erneling and David Martel Johnson. Oxford and New York: Oxford University Press. $98.50. xiii + 549 p; ill.; citation and subject indexes. ISBN: 0–19–513932–1 (hc); 0–19–513933–X (pb). 2005.

This collection of 29 essays explores the respective contributions of the brain sciences and social/cultural sciences to understand the minds of humans. The papers are intended for an interdisciplinary audience in the cognitive sciences. Issues addressed include: What is a "Mind"? Is the concept of Mind best understood using the methodologies and models of contemporary neuroscience, or is this concept more amenable to the nontechnical, culturally based concepts of everyday language (e.g., the language of folk psychology)? If Mind is modeled as synonymous with how brains function (whether at the molecular, cellular, circuit, or systems levels of analysis), then an answer to the question, "What is a Mind?" will be reductionistic. Conversely, if mind and thought are defined by what we think about rather than by the neural states associated with cognitive states, then it is our culture, not our biology, that proves this intentional content.

Neuroscientists clearly reject two claims associated with psychophysical dualism: first, minds and brains are ontologically distinct substances and, second, scientific details concerning how brains compute information cannot, in principle, constitute a complete explanation of what it is to "think." However, the editors argue that neuroscientists uncritically adopt a related Cartesian assumption: "all basic mental or cognitive entities count as individuatable states of mind stuff and, as such, are states of particular brains that belong to particular persons" (p 249). On the cultural model of analysis argued for in these essays, this assumption is rejected: cognition and thought are not simply neural computations occurring in a cultural vacuum. Although cognition and thought are, in a sense, computational neural states, culture provides at least part of the input for *what* is to be computed. Perhaps culture even defines in part *how* cognitive states are processed!

I take issue with the essays that suggest the cultural sciences' understanding of human mind and thought are relatively autonomous from the (computational) models of the neurosciences. Although the (semantic) content of language and thought may be culturally contingent, how the so-called "language of thought" is processed, organized, stored, and made accessible as conscious states is a function of our brains. So, in respect to