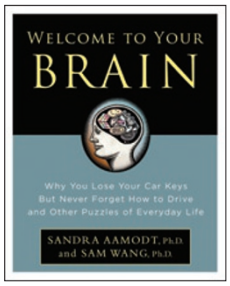
Brain science for the novice



Welcome to Your Brain

by Sandra Aamodt and Sam Wang

Bloomsbury USA, 2008
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Reviewed by Steven Hyman

Welcome to Your Brain by Sandra Aamodt and Sam Wang is a remarkably ambitious book that is aimed at sophisticated general readers. The authors' ambition is revealed in the scope of this express train of a book as it speeds in just over 200 pages from basic sensation to the neurobiology of happiness, religiosity and the use of oxytocin nasal spray to manipulate trust. The writing is very clear and, with the exception of the occasional joke or aside meant to create a welcoming tone, highly efficient. Indeed, the writing was so spare that sometimes I wondered whether a non-scientist reader could follow the arguments. I don't mean to carp over much, however, as the book is extremely enjoyable, very much up to date and a superb general overview of brain science for the non-neurobiologist.

One of the strengths of the book is that it weaves a modern cognitive neuroscience point of view into its exposition. It begins by explaining to the reader that most neural processing is unconscious, absolutely opaque to introspection, and that the brain uses many tricks and short cuts in the service of rapid and adaptive interactions with the world. By the time readers reach the second page of chapter one, they are not only learning how the brain throws away information in favor of processing speed but also the way in which the brain's adaptive tricks can produce irrational economic behavior. This stance provides a more honest and interesting picture of the brain than that provided by most books for general readers (and some textbooks as well), which tend to describe the wonders of sensation and cognition, and then only reveal later, if at all, that humans are prey to illusions and irrationality. Indeed the importance of emotion, not only in its own right, but also for 'healthy' decision making, is well presented in *Welcome to Your Brain*.

The authors do not shy away from controversy. For example, they address the apparent increase in the incidence of autism spectrum disorders by noting that diagnostic criteria have broadened in recent years and that the existence of new behavioral interventions for autism make it well worth getting a diagnosis. As a result, it is very difficult to compare current measures of incidence with historical measures. The authors also take on the tragic controversies swirling in the autism parent community over whether childhood vaccinations or the mercury-containing preservative thimerisol, which was once contained in some vaccines, might cause autism. Essentially, all well-collected evidence argues against these possibilities, but the stubborn persistence of this fear has led some parents to avoid vaccinating their children.

What would I wish for if this book is successful enough to warrant a second edition? Just as the brain may trade speed for accuracy, the authors have made an adaptive choice to provide a very broad (and fairly accurate) overview at the expense of depth. This tradeoff is occasionally problematic, however, most clearly in the lack of useful diagrams (although perhaps this decision belonged to a cost conscious publisher rather than the authors). There are many humorous cartoons that make the book friendlier, perhaps, but which lack any explanatory content. To return to the topic of autism, there is a brief paragraph that mentions recent discoveries linking neurexin and neuroligin to pathogenesis, at least in some rare Mendelian forms of autism. More severe forms of autism are often characterized by seizures. The authors write "epilepsy is a disease of brain excitability that occurs when the balance between excitation and inhibition is disrupted, leading to uncontrolled excitation that causes seizures in the body. It is easy to imagine how damage to the neurexin or neuroligin genes could lead to defects in this synaptic balance that cause seizures." The description of epilepsy in the first sentence, although typically spare, is both clear and useful; however, without a simple picture of a synapse showing the position and interaction of neurexin and neuroligin in synapses, and perhaps their interaction with neurotransmitter receptors, the second sentence might seem unintelligible to the lay person. Other examples in which unavoidable technical terms might be rendered more comprehensible (and memorable) with a simple diagram include the forbidding list of peptides that are involved in feeding and energy balance. I suspect that the addition of ten or twelve simple diagrams would make this wonderful book even more useful and the loss of such pictures as those on page 103 showing the bicyclist waiting at a traffic light would not be a terrible loss.

All books covering such enormous territory have factual errors or make excessive speculative stretches; I detected remarkably few. A few examples of such are that the avid lobotomist Walter Freeman was actually a neurologist, not a psychiatrist (the most salient issue about his background, however, is that he had no surgical training); the cause of narcolepsy in the Doberman model is the orexin type 2 receptor, not the peptide. In the category of 'stretches', that is, putting speculative arguments in a strongly declarative voice, the discussion of social cognition as the basis of religion represents one, even if it is a promising idea, and wherever the historical Mt. Sinai actually was and whatever occurred either at its base or at its summit, Mosaic hypoxia is not likely to explain much about his subsequent teachings. Although seizures may have produced the visions of St. Theresa of Avila, they do not explain her capacity for vivid communication or, for that matter, her organizational abilities as a religious leader. Trying to explain too much with reductive biomedical arguments is an occupational hazard of popular science; despite the examples adduced here, the authors largely avoid this pitfall (for example, there is no mention of El Greco's putative astigmatism). Indeed, *Welcome to Your Brain* explains a great deal with elegance, clear prose and a welcome sophistication. ■

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Editor's note: Sandra Aamodt was formerly the chief editor of Nature Neuroscience. She left the journal in April 2008.