

much more cautious than other authors about the reliability and scope of brain scans and other techniques of modern neuroscience. He knows that scientists can measure brain activity only indirectly, that they can obtain largely correlational data, and that colorful (and impressive) brain scans are actually complex statistical compounds of a number of individuals, accompanied by various possibilities for error and over interpretation.

Gazzaniga doesn't buy the idea that there is no moral responsibility just because "the brain makes us do it," since moral responsibility emerges from the interaction of brains with particular social environments, the latter being the result of historical and cultural forces. The brain is certainly a crucial nexus, but "responsibility" isn't located anywhere within it. He also doesn't think that consciousness is an "illusion," a conclusion that, ironically, others derive in part from his own experiments on split-brain patients. Rather, consciousness emerges from a systemic dynamic

network operating inside the intact brain, a network that we can partially disrupt and study under special circumstances, such as those offered by Gazzaniga's patients.

You may have noticed that I have used the word *emerge* more than once in describing Gazzaniga's take on things neuroscientific. Emergentism refers to one of two positions in philosophy of mind: on the one hand it encapsulates the (strong) claim that there are truly novel (i.e., irreducible to lower levels) properties of matter when certain conditions of complexity and organization apply. On the other hand it refers to the (weak) claim that some phenomena are so complex that our only hope at reasonable scientific descriptions rests on focusing on the proper level of analysis rather than attempting a reduction to the basic principles of physics, even if this were possible in theory.

I cannot tell from the book whether Gazzaniga is an ontological (strong) emergentist, but he is at the very least an epistemological (weak) one. Epistemo-

logical emergentism is rather uncontroversial, as it is true as a matter of pragmatism that we need different theories and concepts to understand different types of phenomena (try, for instance, to build a quantum mechanical model of the Brooklyn Bridge and see how far you get). Ontological emergentism—just like its chief rival, ontological reductionism—is a metaphysical thesis about which it is best to remain agnostic.

Who's in Charge is a must-read for anyone interested in the broader implications of modern neuroscience not wishing to fall for easy sensationalism or for philosophical claims masquerading as science. In the end, as Gazzaniga puts it: "We are people, not brains. . . . Go have a dry martini, put your feet up, and read a good book." A wise suggestion indeed. ■

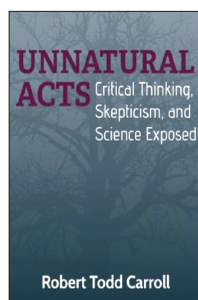
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Thinking: An Unnatural Act

HARRIET HALL

Robert Todd Carroll, the author of the invaluable *Skeptic's Dictionary*, has written an e-book that makes a perfect complement to his *Dictionary*. Titled *Unnatural Acts: Critical Thinking, Skepticism, and Science Exposed!*, it is essentially a primer on how to think.

The "unnatural acts" of the title are the acts of critical thinking, which don't come naturally to our imperfect human brains. Our brains evolved an instinctive, intuitive, quick-and-dirty way of thinking that served our forebears well in their environment. A slower, more systematic, more critical way of thinking developed later and brought us science. It serves us better in today's world but is more difficult to achieve. It requires education and concentrated effort to overcome the nat-



Unnatural Acts: Critical Thinking, Skepticism, and Science Exposed!

By Robert Todd Carroll. James Randi Educational Foundation, 2011. Available through Amazon.com and other electronic outlets exclusively in e-book format, \$9.99.

ural tendencies imposed on us by our evolutionary history.

The brain is an illusionist. It works by taking shortcuts, deceiving us into seeing things that aren't there and believing things that aren't true. We see the sun apparently moving across the sky, and it takes sophisticated understanding to overcome our first assump-

tions. Nature has programmed us to increase our chances of survival and reproduction, not to seek the truth. Religious literalists, New Age philosophers, and other true believers prefer magical thinking to science because we are hardwired to think that way. So creationism is often preferred over evolution, and fanciful medical quackeries

are often preferred over effective treatments proven by scientific studies.

Critical thinking is *hard*. We must learn that we can't trust our perceptions, memories, and intuitions. This requires education and practice. It's frustrating to accept that our most cherished beliefs might be wrong. And it's frustrating to know that success is elusive: the truths we learn will always be provisional, and we can never be certain whether we have looked at all the relevant data objectively.

In successive chapters, Carroll explains:

- Critical thinking is unpopular: you will lose friends and alienate your neighbors.
- Trust no one, not even yourself: you, too, are subject to perceptual distortions and cognitive biases.
- Language is often used to manipulate thought and behavior.
- Groupthink—communal reinforcement—seduces groups of people into bad decisions.
- It is becoming increasingly difficult to identify reliable information amid all the hype, propaganda, advertising, and misinformation.
- Anecdotes are compelling: a good story trumps a dozen scientific studies. Scientific studies are more reliable in the search for truth but are also subject to bias.
- Fallacies in reasoning are widespread and natural; man is an irrational animal.
- Natural factors conspire to lead us into error, but there is hope that we can learn to overcome our natural tendencies and become critical thinkers.

In the final chapter, Carroll provides practical advice: fifty-nine ways to develop your unnatural talents in critical thinking, skepticism, and science. This list will be enhanced by the blog *Unnatural Acts* (www.59ways.blogspot.com), where he will be offering commentary and examples of the fifty-nine

ways (plus a few more). Five appendices round out the banquet with detailed discussions of cell phone radiation, interstellar travel, acupuncture, what it really means to think critically, and step-by-step instructions on how to create your own pseudoscience. Refreshingly, he admits to errors of his own in *The Skeptic's Dictionary* and corrects the record.

I laughed out loud at Carroll's account of his first attempt at teaching logic as a newly minted philosophy PhD. "If I remember correctly, about twenty-five students signed up for the class and three finished. One of the three stayed because he liked me. Another stayed because he didn't know how to drop a class. The remaining student understood the material in the text . . ." Over time, he progressed from teaching traditional logic to offering more useful courses in critical thinking as a way of life, emphasizing an understanding of the psychology of bias and other sources of error and embodying an attitude of intellectual humility, confidence in reason, intellectual curiosity, and intellectual independence.

Since critical thinking is important to every aspect of human life, he illustrates his points with examples drawn from every imaginable field: religions, UFO cults, psychology, alternative medicine,

politics, parapsychology, martial arts, criminology, climate change, news media, vaccines, cell phone radiation, cancer clusters, and more.

Some of his examples will be familiar from other skeptical writings, like Clever Hans (the horse that responded to its owner's unconscious body language) and the basketball/gorilla video illustrating inattention blindness. Others were new to me, like the example of audio pareidolia where a Bob Dylan song lyric is heard as "throw my chicken out the window."

There can never be too many books on critical thinking. Carroll's is a worthy contribution to the skeptical literature: comprehensive, easy to read, and packed with entertaining examples that vividly illustrate the concepts. For those new to skepticism, it can serve as a valuable textbook for learning how to think. It will be useful to even the most jaded skeptics among us who think we already know how to think; we all still make mistakes, we need to be reminded anew of old lessons, and there is always more to learn. ■

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