
their own scientific discoveries.

Why is scientific thinking so difficult? Cromer accepts the view of Swiss psychologist Jean Piaget that only people who advance through the four developmental stages—sensorimotor, preoperational, concrete operational, and formal operational—are equipped to handle the complexities of physics or advanced mathematics. In an ideal progression, an individual will have reached the formal operational level—capable of solving several problems simultaneously, able to theorize, and so forth—by adolescence.

Unfortunately, as Piaget himself noted, the only way for people to advance from one stage to the next is through the “accumulation of relevant experiences”—learning the ins and outs of word problems, for instance, or understanding the basis of mathematical proofs. By almost any measure, current American educational methods are not providing these experiences. Cromer’s suggestions for countering this deficiency—compressing public education after grade seven into an intensive, two-year “academy” that would develop reasoning skills, and then, after further optional study, admitting the most promising students into college at age 16—are provocative, if full of practical pitfalls.

In the course of *Uncommon Sense*, Cromer demolishes many popular science myths, including the notion that extraterrestrials will visit or attempt to contact Earthlings, or that humankind, given the known laws of physics, will ever develop the capability for interstellar travel. (A moment of silence, please, for the Trekkies in our audience.) Real science, Cromer concludes, will likely find its new frontiers much closer to home: “It is from the fields of molecular biology, brain research, and computer technology that the epochal discoveries of tomorrow will come.”

THE ASTONISHING HYPOTHESIS: The Scientific Search for the Soul. By Francis Crick. Scribner’s. 336 pp. \$25

The title is teasing. Has Francis Crick found religion in his old age? The thought

is quickly dispelled. His “astonishing hypothesis” is simply that what we call self, consciousness, the psyche, the ego, or the soul can be explored by ordinary scientific means—through brain anatomy, nerve morphology, and the physiology of nerve function. It is “astonishing,” Crick maintains, because so few psychologists, neurologists, or neurobiologists have attempted to study consciousness by scientific means, and because the history of religion, philosophy, and popular belief has long separated mind from body in a comfortable dualism.

Crick, who with James Watson discovered the structure of DNA in 1953, is not deterred by the huge gaps in our knowledge. He wants scientists to penetrate the black box we call the mind by considering hereditary pathologies, strokes, brain injuries, single-nerve stimulations, histological analysis of the cortical and thalamic regions of the visual system, and especially experiments using primates and other mammals. How do the neurons in different regions of the brain transmit information to each other? How is the information stored and processed so that we can construct a symbol of the external reality that we then recognize as our reality? Focusing on visual perception, Crick shows that the final representation of how we see the world is the product of much “unconscious” analysis.

Crick’s rallying cry for psychologists, neurologists, neurobiologists, and molecular biologists to turn serious attention to the “search for the soul” is much like Erwin Schrödinger’s attempt to bring physicists to genetics in his influential *What Is Life?* (1946). While the scientific benefits of this enterprise are indisputable, the further demystification of such qualitative experiences as awe and love does produce twinges of regret. As Crick writes, “ ‘You,’ your joys and your sorrows, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules.”