



The Creating Brain: The Neuroscience of Genius, by Nancy C. Andreasen, M.D., Ph.D. Washington, D.C., Dana Press, 2005, 197 pp., \$23.95.

The Creating Brain is Nancy Coover Andreasen's latest contribution to her ambitious goal of educating readers about the complex neurobiological basis of human behaviors. In her third book in this series, she addresses a question that has puzzled researchers to the present day: *by what process does the human brain bring forth astonishing achievements in the arts and sciences that have never before been conceptualized?* Readers familiar with Dr. Andreasen's previous works, *The Broken Brain* (1) and *Brave New Brain* (2), will recognize her personal, conversational narrative and the breadth of her knowledge. As if she were speaking with you at dinner, she explores the earliest record of human creativity inside the Caves of Lascaux in Dordogne, France, and then the works of Leonardo da Vinci, Michelangelo Buonarroti, William Shakespeare, Amadeus Mozart, Samuel Coleridge, and many others, including a discussion she had aboard an airplane about the nature of the creative process with playwright Neil Simon.

The book begins with the history of research in child development and the earliest studies in creative intelligence conducted by Alfred Binet and Lewis Terman, beginning nearly a century ago. Dr. Andreasen's description of the longitudinal study of "Terman geniuses" or "termites" (highly intelligent children followed from childhood to their adult years at Stanford University) recalls nearly forgotten but important early findings that developed a key distinction between intelligence and creativity. The text cleverly uses the autobiographical accounts of a series of renowned artists, scientists, and writers to illustrate their special insights into their own creative process. The author highlights the astonishing similarities between the almost unconscious, turbulent state that many of these figures described as their subjective cognitive experience at the time of their greatest productivity. From Mozart, for example:

All this fires my soul, and, provided I am not disturbed, my subject enlarges itself, becomes methodized and defined, and in the whole, though it be long, stands almost complete and finished in my mind, so that I can survey it, like a fine picture or a beautiful statue, at a glance.... What a delight this is I cannot tell! (p. 40)

The next chapter guides the reader through a careful dissection of the neurobiology of the creative process by explaining the organization of the brain from the cellular and neuroanatomic level to the interaction of various brain regions observed in functional brain imaging. These lessons are then applied to explicate the mechanisms by which memory is formed, the mapping of language, and the neural basis of unconscious thought.

After providing this foundation in brain science, Dr. Andreasen uses it to probe the more complex topic of genius and insanity. Here we learn of her work with the Iowa Writer's Workshop as well as seminal studies by Adele Juda in the 1920s. The overlap between creative genius and conditions such as schizophrenia and depression is discussed in detail, with special insights into the lives of key figures such as John Nash. Dr. Andreasen speaks of her own surprise at the high rate of mood disorders among the Iowa writers, which refuted her original hypothesis that creativity would be more heavily associated with psychotic disorders. She frames these findings in the nature versus nurture concept coined by Francis Galton in the 19th century and illustrates the influence of nurture with a detailed accounting of the environmental factors during the most creative periods in history that allowed individuals to express their natural gifts.

The text concludes with suggestions on how to understand our own creating brains and strategies to enhance our creativity and that of our children. Grandmotherly advice from Dr. Andreasen, down to the choice of bedtime reading to the children, is a warm and unique end to a book on the neurobiology of creativity.

In her preface to *The Creating Brain*, Dr. Andreasen briefly discusses her childhood and the ways in which her socially conservative environment, particularly with regard to women, interacted with her precocity, intelligence, and ambition. Her parents had expressed reluctance about her plans to enter medical school. Shortly before his death her father told her, "And you did turn out OK after all." Indeed she did! And the fields of psychiatry and neuroscience are much enriched for that, as are the lives of those of us fortunate enough to have worked with her for the past 13 years and enjoyed the pleasure of dinner and wine and conversation with her.

References

1. Andreasen NC: *The Broken Brain: The Biological Revolution in Psychiatry*. New York, Harper & Row, 1984

2. Andreasen NC: *Brave New Brain: Conquering Mental Illness in the Era of the Genome*. New York, Oxford University Press, 2001

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Psychiatry, Psychoanalysis, and the New Biology of Mind, by Eric R. Kandel, M.D., with commentaries by Arnold M. Cooper, M.D., Steven E. Hyman, M.D., Thomas R. Insel, M.D., Donald F. Klein, M.D., Joseph LeDoux, Ph.D., Eric Nestler, M.D., John M. Oldham, M.D., Judith L. Rapoport, M.D., and Charles F. Zorumski, M.D. Washington, D.C., American Psychiatric Publishing, 2005, 414 pp., \$57.95.

Eric Kandel, University Professor at Columbia University College of Physicians and Surgeons, was awarded the 2000 Nobel Prize in Medicine or Physiology for his groundbreaking work on the molecular mechanisms underlying learning and memory. His discoveries, based on his initial studies of the sea snail *Aplysia* and later studies in mice, demonstrated that learning depends on changes in the strengths of synapses and that long-term, as opposed to short-term, memory requires the activation of a gene cascade that leads to the growth of new synaptic connections.

This book consists of seven of his previously published papers spanning the period between 1979 and 2000, as well as the commencement address he gave in 2001 to Columbia's graduating medical students. The papers focus on his neurobiological research, recommendations for new intellectual frameworks for psychiatry and psychoanalysis, and guidelines for future investigations in clinical psychiatry and psychoanalysis. Each paper is accompanied by commentary from leading psychiatrists and psychologists, some of whom are neuroscience researchers and some psychoanalysts.

The author's collected papers are preceded by a personal memoir of his undergraduate years at Harvard, when, fascinated by the insights of psychoanalysis, he decided to enter medical school in order to become a psychoanalyst. In medical school and later in his formal psychiatry training at the Massachusetts Mental Health Center in Boston in the late 1950s and 1960s, he became profoundly disappointed with the anti-intellectualism and biology-psychoanalysis dichotomy he encountered in American psychiatry. This disappointment contributed to his eventual decision to pursue neurobiological research instead of further clinical training.

He offers these essays with the "hope that molecular biology will provide a fresh perspective on the study of behavior and that the ensuing insights will lead to a new science of the mind, one that is grounded in the rigorous empirical framework of molecular biology yet incorporates the humanistic concepts of psychoanalysis." His afterword, written in 2004, underlines his hope that psychiatry and psychoanalysis will "again capture the best and brightest of the next generations" by joining with neuroscience to develop a true biology of the mind.

Today, it is easy to forget how revolutionary Kandel's work was in the late 1970s, when he reported his findings that experience could alter the brain. I vividly remember, during my second year of formal psychiatry training, hearing him present an early version of the first paper in the book, "Psychotherapy

and the Single Synapse." My colleagues and I were a bit incredulous that snails could teach us anything about the complexities of human beings. As Joseph LeDoux, the Henry and Lucy Moses Professor of Science at New York University, comments at a later point in the book, Kandel's work is taken for granted by neuroscientists today, but it was a "long shot in 1983."

For me, the heart of the book is "Biology and the Future of Psychoanalysis: A New Intellectual Framework for Psychiatry Revisited," originally published in 1999 in the *Journal* (1). Kandel specifies eight areas in which biology and psychoanalysis could cooperate: 1) the nature of unconscious mental processes, 2) the nature of psychological causality, 3) psychological causality and psychopathology, 4) early experience and the predisposition to mental illness, 5) the preconscious, the unconscious, and the prefrontal cortex, 6) sexual orientation, 7) psychotherapy and structural changes in the brain, and 8) psychopharmacology as an adjunct to psychoanalysis. Arnold Cooper, a training and supervisory analyst at the Columbia University Center for Psychoanalytic Training and Research, exhorts his colleagues to accept Kandel's challenge to study the "biology of subjectivity, consciousness, selfhood, and conflict."

The strength of this book is based on its clear descriptions of the neurobiological correlates and underpinnings of psychiatric clinical science and on its specific suggestions for areas of future research, especially related to what Kandel acknowledges as psychoanalytic insights. A limitation is that in some ways he is challenging an outdated version of psychoanalysis prevalent in the United States until at least the 1970s, when, indeed, many analysts behaved and taught as if the brain were not a relevant organ. Kandel himself quotes Anton Kris, who says that "one listens differently now." Contemporary medical educators would not recognize Kandel's characterization of medical student education as a model that focuses exclusively on teaching psychotherapy. Analysts would not universally accept Kandel's assumption that the highest aspiration of psychoanalysis is to become "the most cognitive of neural sciences." Cognition, as most analysts use the term, simply does not capture all of the concerns of psychoanalysis, including emotion, empathy, suffering, the development of selfhood, and the repetition of harmful or self-endangering behavior.

John Oldham describes Kandel's last essay as "eloquent, integrative, and visionary" but acknowledges that we are far from translating individual genetic and other information into real therapeutic outcomes. I wish that more of the commentaries had similarly focused on the complexities and challenges of translating Kandel's work into empirical clinical research, let alone clinical outcomes.

This hopeful and inspiring book will be especially useful for two groups—for teachers of medical students, psychiatric residents, and psychoanalytic candidates and for those trained in psychoanalysis who accept the challenge of psychoanalytic research. It is clear, succinct, illustrated by useful neurobiological models, and well referenced. It details many advances in our understanding of the way the brain works, specifically regarding learning and the formation of memories. Especially engaging are Kandel's vivid descriptions of his psychiatric training, his infectious enthusiasm for teaching, and his exhortations to study empirically the insights of psychoanalysis, which, he says "still represents the most coherent and intellectually satisfying view of the mind."