

Interpreting neuroimages: The technology and its limits

March 20 2014

Neuroimages play a growing role in biomedical research, medicine, and courtrooms, as well as in shaping our understanding of what it means to be human. But how helpful are they at answering complex questions such as: What is depression? Is a defendant lying? Do we have free will?

These are among the topics explored in <u>Interpreting Neuroimages: An</u> <u>Introduction to the Technology and Its Limits</u>, a special report of the *Hastings Center Report*. It is edited by Josephine Johnston, a research scholar and director of research, and Erik Parens, a senior research scholar, and it includes commentaries by leaders in neuroscience and its ethical implications. The report is the product of a project funded by The Dana Foundation.

Neuroimaging technologies capture information about the brain as a person thinks, feels, and experiences sensations. They will be indispensable to the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) initiative launched by the federal government this year to advance understanding of the human brain and brain disorders.

The special report consists of six essays:

Neuroimaging: Beginning to Appreciate Its Complexities



Erik Parens and Josephine Johnston

While neuroimages are being used in courtrooms to help determine both guilt and sentencing, in marketing, and in the diagnosis of mental disorders, they are "readily open to misinterpretation, overinterpretation, and misapplication," write Parens and Johnston. They advise scientists, clinicians, lawyers, and others to be clear about how neuroimages are made and what they can—and cannot—do.

Functional Neuroimaging: Technical, Logical, and Social Perspectives

Geoffrey K. Aguirre

With new, powerful analytic techniques, there has been a shift in goals, from trying to understand the neural basis of a particular emotional or mental state to trying to predict behavior. But there are limits to the information that neuroimaging can convey. Aguirre explains the many steps involved in transforming raw data into a finished brain image.

Brain Images, Babies, and Bath Water: Critiquing Critiques of Functional Neuroimaging

Martha J. Farah

Neuroimages have attracted a lot of criticism, such as that they do not show neural activity directly and that they are "too convincing." Farah takes on the criticisms and finds that in some cases they have been overextended in ways that are inaccurate or misleading. "None of the criticisms reviewed here constitute reasons to reject or even drastically curtail the use of neuroimaging," she concludes.



Neuroimaging and Psychiatry: The Long Road from Bench to Bedside

Helen S. Mayberg

Neuroimaging has implications for psychiatric diagnosis, treatment, and risk assessment, but it is not ready for use in clinical psychiatry. Claims to the contrary "give false hope to patients and their families," writes Mayberg, who reached this conclusion after spending the last 20 years studying <u>functional neuroimaging</u> patterns in patients with depression.

Seeing Responsibility: Can Neuroimaging Teach Us Anything about Moral and Legal Responsibility?

David Wasserman and Josephine Johnston

Neuroimages that visualize a decision-making activity or its timing could alter our understanding of personal responsibility by challenging the notion of free will. Although neuroscience may point toward determinism, Wasserman and Johnston argue that the concepts of moral and legal responsi¬bility are likely to be modulated rather than discarded.

Living with the Ancient Puzzle

Erik Parens

Neuroimaging can help explain how experiences arise in human beings but Parens thinks that it cannot by itself let us understand what it means to be a human being.

In addition to Johnston and Parens, contributors are Geoffrey K.



Aguirre, associate professor of neurology at the University of Pennsylvania and associate director of the Center for Neuroscience and Society; Martha J. Farah, director of the Center for Neuroscience and Society and the Walter H. Annenberg Professor in the Natural Sciences at the University of Pennsylvania; Helen S. Mayberg, professor of psychiatry, neurology, and radiology and the Dorothy Fuqua Chair in Psychiatry Imaging and Therapeutics at Emory University School of Medicine; and David Wasserman, a visiting scholar in the Department of Bioethics at the National Institutes of Health.

Provided by The Hastings Center

Citation: Interpreting neuroimages: The technology and its limits (2014, March 20) retrieved 2 May 2024 from <u>https://medicalxpress.com/news/2014-03-neuroimages-technology-limits.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.