

The BRAIN Initiative promises to advance our basic knowledge of how the brain works, and foster development of tools that can precisely intervene on those functions. This work may deliver great insight and treatments to help patients and families who experience the most devastating effects of brain disorders or injury, and may transform daily life even for healthy people. It's truly an exciting time for neuroscience with proliferating brain research projects around the globe.

### ***Neuroethics as a tool for advancement of neuroscience***

The most fundamental aspects of our selves - such as personality and temperament - can be rapidly changed due to brain injury and, in some cases, brain interventions. Neuroscience research raises unique ethical questions, beyond typical research ethics or compliance issues. Familiar topics in bioethics such as privacy, safety, fairness, freedom and free will, personal identity, informed consent, and moral responsibility, can take on new dimensions and complexities given the unprecedented precision of new neurotechnologies and tools, and the brain's centrality to human identity<sup>1</sup>. Questions that are important to address include, for example:

- What are the long-term responsibilities of researchers (and funders) to people who receive implanted neural devices, particularly those who have favorable results?
- If the collection and sharing of neural data is crucial to effective research, how does it intersect with expectations of privacy and confidentiality? How do patients' and investigators' perceptions of the risks and benefits of data sharing align or differ?
- How might new neurotechnologies disrupt fundamental notions of free will and agency and what broader implications might there be for legal policies or commercial realms?
- Will improved understanding of brain circuitry allow for prediction of risk for future brain disorders and resilience against injury? How might this, in turn, affect healthcare, insurability, and healthcare policy?

Neuroethicists can work with neuroscientists to address these and other questions that arise in association with neuroscience research – both its conduct, and application of research findings to human beings. Neuroethicists can help scan the horizon and assist in anticipating and navigating ethical concerns. Importantly, neuroethics is not a policing mechanism meant as a constraint on neuroscience progress, but rather a useful tool scientists can harness to facilitate neuroscience research. For these reasons, neuroethics has emerged as a priority research area under the NIH BRAIN Initiative.



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<sup>1</sup> Henry T. Greely, Khara M. Ramos, Christine Grady *Neuroethics in the Age of Brain Projects* *Neuron*, 2016 Nov 2, 92(3): 637-641.

## ***How is neuroethics research conducted?***

Utilizing a series of analytical and philosophical frameworks<sup>2</sup> to identify and explore the underlying values and assumptions of a variety of stakeholders, a neuroethicist can help guide how neuroscience research is designed, conducted, interpreted, and applied. Neuroethicists work to anticipate and help mitigate challenging value conflicts – particularly those that may arise given the privileged status the brain has in human life and self-identity – to empower neuroscience research.



There are two major modes of neuroethics research. Both involve philosophical analysis and ethical reflection. Just as in scientific research, neuroethics research can be exploratory or hypothesis-driven. Conclusions from neuroethics research aim to inform and help guide neuroscience research and/or application of research findings.

1. **Conceptual/philosophical research** involves analysis of integral concepts such as privacy and personal identity, and may involve interdisciplinary analysis and synthesis of existing literature and practices from law, policy, ethics, and neuroscience. For example, researchers might explore the meaning of fluctuating capacity to consent and whether it points to the need for changes in informed consent for brain stimulation studies.
2. **Empirical research** approaches ethical issues with systematic data collection, including, for example, data on scientists' views or human participant values around neuroscience research and neurotechnology through quantitative (e.g. surveys) and/or qualitative (interviews) research. Qualitative data can provide rich insight on the human experience and is valuable in determining areas for further inquiry. For example, interviews of deep brain stimulation research participants about perceived changes of identity might inform revisions to informed consent policies or study design.

## ***How can I integrate neuroethics into my project?***

Having a neuroethics perspective integrated into a research project can be a powerful way to maximize positive impact of the research. Suggestions for opportunities to integrate neuroethics into a project could include:

1. Seeking the advice of an ethicist on experimental design, research protocols, etc.
2. Collaborating with an ethicist to explore a unique ethical concern related to the implementation of the experiment or possible implications of study findings.
3. Collaborating with an ethicist to conduct parallel empirical ethics studies with patients, participants, the public, or researchers.

**To learn more please visit:** <https://www.braininitiative.nih.gov/about/neuroethics.htm>

**And see:** *Gray Matters*, volumes 1 and 2, from the Presidential Commission for the Study of Bioethical Issues, available at [bioethics.gov](http://bioethics.gov)

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<sup>2</sup> Martha J. Farah *An ethics toolbox for neurotechnology* Neuron, 2015 Apr 8, 86(1): 34-7.