

ethics to the work of bioscience. When my older brother applied to medical school in 1964, he prepared for his admission interviews by spending countless hours reviewing current events, art history, literature, and classical music. The model of medical ethics that prevailed then was an Aristotelian “virtue ethics.” Ethical behavior was assumed to flow from virtuous individuals—in my brother’s case, from individuals well-schooled in the humanities and attentive to the world around them—not from training in the responsible conduct of research, review of conduct by ethics committees and institutional review boards, or oversight by professional ethicists. Beginning in the late 1960s, in response to some very public ethical lapses (see Rothman 1991), this model was turned on its head: rather than ethics guiding action, actions were subject to the review of professional ethicists who were called on to assess and direct the behavior of clinicians and researchers. What has led to the felt need for a specialty in neuroethics? How will such a specialty affect the ethical sensibilities and behavior of neuroscientists?

As I mentioned at the outset, my response contains more than a hint of disciplinary imperialism. I am, after all, a creature of my training in social science and, as such, I cannot help but believe that a sociology of neuroscience offers a broader and richer view of the moral problems presented by neuroimaging than that provided by neuroethical review. There is an irony here. Stubbornness about the value of each disciplinary perspective that informs the work of bioethics, while potentially divisive and counterproductive, will, in

the end, prevent the bioethical project from dissolving into nothing more than undisciplined oversight. ■

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Finding the Right Compass for Issue-Mapping in Neuroimaging

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In “Imaging or Imagining? A Neuroethics Challenge Informed by Genetics,” Judy Illes and Eric Racine (2005) explore whether reflections on ethical, legal, and social issues (ELSI) in genetics will help settle such issues in the context of neuroimaging. They discuss similarities and differences between ELSI in genetics and functional neuroimaging and summarize the comparison in their Table 2. To their valuable discussion, we would add the following comment—there are issues missing from Table 2 and, once they are added, genetics ELSI looks even less like a useful starting

point and rather more like inadequately-charted and overlapping but not identical territory.

ADDITIONAL NEUROIMAGING BUT NOT GENE TESTING AND HUNTING ISSUES

There are additional issues found in neuroimaging but not found in gene testing and gene hunting (the focus of the Illes and Racine comparison). For example, unlike diagnostic tools in the genetics realm, the technologies of functional

neuroimaging carry with them some risks of physical harm. PET and SPECT, for example, utilize radioactive isotopes and CT uses ionising radiation, the long-term effects of which are as yet unknown (Hinton 2002). MRI can carry a risk of physical injury if the person or nearby environment is not properly screened for metal implants or objects (Kulnych 2002). Furthermore, there is the risk of acute discomfort and psychological distress from lying prone in the confined space of an MRI scanner (Kulnych 2002), arrhythmias in relation to rapid switching of magnetic gradients, and respiratory arrest, seizure, and death if sedation is used (to reduce bodily movement that can negatively impact the quality of MRI results; Hinton 2002). These and other physical risks become particularly relevant in the context of neuroimaging research using healthy controls and become particularly acute in the context of pediatric research. For example, can parents consent to fMRI on their children as healthy controls (particularly if it involves the use of sedation)? Such questions take us, in the context of neuroimaging ethics, to the complex and contested ethics debate over acceptable levels of risk of physical harm for children in research.

In addition, unlike genetics, neuroimaging can contribute to the assessment of levels of cognitive function and, as such, has the potential to engage questions concerning the determination of the beginning and end of life. When has a human being (as possibly distinct from a person) died? At what point in development does a fetus reach various levels of cognitive function? What is the significance of various levels and kinds of cognitive function for the ascription of rights? How should human beings at varying levels of acquisition and loss of cognitive function be treated?

SAMPLE GENETICS BUT NOT NEUROIMAGING ISSUE

There are also issues found in genetics but not found in neuroimaging. For example, intellectual property issues such as the patenting of human biological material have consumed much of the intellectual capital expended on genetics ELSI over the past decade.

ADDITIONAL SHARED ISSUES

There are also additional issues shared by neuroimaging and genetics but not yet adequately dealt with in the ethics of genetics. Consider, for example:

- *Secondary use of research data*—Not only has the neuroimaging era ushered in substantial concerns respecting privacy and confidentiality, but it has also exacerbated unresolved problems regarding research participant consent in the context of secondary use of data. Can participants provide a legally or ethically valid consent to unspecified future use of imaging data by the primary researcher or

other researchers with whom the data might be shared or, at the other end of the spectrum, must researchers seek a fresh consent from participants when the particulars of the secondary research become known? Do acceptable alternatives exist between the two ends of the spectrum (e.g., tiered or graduated consent)?

- *Enhancement*—Efforts to use neuroimaging technologies, either alone or in conjunction with other neurotechnologies, in the context of seeking to improve cognitive functioning (e.g., better memory) in persons with no identifiable pathology remain controversial. The enhancement/treatment conundrum brings to the fore difficult questions about whether it is possible to meaningfully distinguish between enhancement and treatment and, if so, whether biotechnological enhancement should be encouraged or discouraged (Wolpe 2002) through, for example, the provision or withholding of public funding for such endeavours. Solutions to the enhancement/treatment conundrum must address related issues pertaining to eugenics, the mitigation of diversity, and the further marginalisation of the vulnerable and disabled.
- *Conflicts of interest*—How should we deal with potential conflicts of interests that can arise when researchers own an equity interest in the sponsoring company, receive royalties from a licensee of the relevant neuroimaging technology, or are otherwise in a position to benefit financially from the research? (Cho 2002; Kulnych 2002)
- *Absence of key voices in ethics review*—Should IRBs be required to include representatives from communities and collectives potentially impacted by the neuroimaging research, either as permanent or *ad hoc* members? Should public interest groups (e.g., mental health advocacy groups) be given the opportunity to address issues pertaining to specific neuroimaging research proposals before the IRB decides whether to approve the research, or should the *status quo* be maintained where only the researcher is given the opportunity to make representations to the IRB?

Once all of these issues (and others like them as these are merely illustrative) are added to Table 2, the appropriateness of regarding the ethics of genetics as providing a solid foundation on which to start building neuroimaging ethics becomes even more questionable. First, we can see that focusing on the territory of genetics may lead us to miss issues to be found in neuroimaging but not genetics. Second, we should reflect on the fact that work on a variety of ethical issues in the shared territory remains remarkably underdeveloped in the area of genetics. For example, years after their identification, the myriad of issues concerning genetics research involving aboriginal communities (e.g., community consent, return of benefits to the community,

and community “ownership” of research data) and management of conflicts of interest remain unresolved in the governance of research instruments and the relevant academic literature. Thus, when seeking to map the territory for the purposes of understanding neuroimaging ethics, we would indeed do well to not simply rely on the ethics of genetics. ■

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Imagining a Neuroethics Which Would Go Further Than Genetics

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In their article “Imaging or Imagining?” the subtitle highlights the approach adopted by Judy Illes and Eric Racine for discussing major ethical issues raised by the new neurosciences: “A Neuroethics Challenge Informed by Genetics.” This way of proceeding is certainly worthwhile: neuroethics can learn a lot from “genethics,” not only concerning the substantive issues but also about the context of its development and the methods of work appropriate for such an ethic.

The comparative method is, in this case, an excellent tool to help us understand the type of issues neurosciences bring forth and the differences that exist between both fields. The fact that these disciplines have expanded in a context where biology has become highly competitive, where scientists must act as entrepreneurs, and the achievements of both disciplines challenge who “we are” has also brought them nearer than any other sector of the bioethical field. Through their comparative approach, the authors have made the choice of a type of ethics; I want first to highlight the orientation they promote. I will then discuss what I consider some limits of genethics, limits we should try avoiding in the emerging field of neuroethics.

Illes and Racine show that genethics focuses on human rights. “The most common fear about genetic information [being] its potential use in justifying denial of access to health insurance, employment, education and even financial loans to people with particular characteristics or diagnoses”

has called an ethics whose principle role is to protect individuals, families and communities from discrimination and stigma. To ensure this protection, the different participants have the duty to act properly. What brings us back to virtue ethics: “to secure responsible and careful interpretation of their findings, avoiding hasty judgments, applications and policies based on them” (Illes and Racine 2005). Ethical, social and legal issues raised by genetics have given bioethics an opportunity to speak an international language which integrates the language of principles but goes beyond—genethics focusing on human rights. Jonathan Mann had already proposed to take this route in view of facilitating a real international dialogue on bioethics (Mann 1997). Genethics has followed this path and has made possible the development of international instruments such as the *Universal Declaration on the Human Genome and Human Rights* (United Nations 1998). A real dialogue among different nations has become possible. It can now be carried on with neurosciences according to Illes and Racine, both fields raising issues which are quite near. I hope it will become real.

In order to make neuroethics an undertaking whose aim would be universal and which would, at the same time, be sensitive to cultural diversity, should we not examine more closely what is genethics, with its strengths and weaknesses? Philippe Goujon, in “The Case of rDNA Techniques” maintains that the “open dialogue between

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