



Neuroethics on the Canadian Neuroscience Landscape

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Introduction

For neuroscience to be applied for maximum knowledge and health benefit, it is critical to understand the interaction of research with ethics and society. Close collaboration between neuroscientists, social scientists and others, along with opportunities for training and access to relevant materials, can ensure that the development, application, and translation of new knowledge is facilitated (Racine and Illes, 2006). The goal of the present study was to understand the landscape of ethics in neuroscience specifically in the Canadian context where a strong intellectual commitment to and financial investment in neuroethics has been made.

Background

Canada invests about CAN\$150 million in public funds a year in neuroscience, representing 21% of the Canadian Institutes of Health Research's (CIHR) entire budget (Sobocki et al., 2006). In addition to the investments in traditional arms of neuroscience, Canada has also made a commitment to innovative, transdisciplinary research such as neuroethics with an investment that exceeds CAN\$600,000 per year at present time. This places Canada among the top funders in the world (CIHR, 2008 and Quirion, 2008).

Reflecting Canada's commitment to neuroethics is the substantial contribution by Canadians to the peer-reviewed literature in the field (Lomber and Illes, 2008; Table 1). Indeed, even Dr. Wilder Penfield's writings may be viewed as early works in neuroethics and

"[t]hrough it was never designated as neuroethics, per se, Penfield's writings are especially relevant to ethical deliberations about neuroimaging and neuromodulation... his own work foreshadowed current areas of inquiry both in neuroscience and neuroethics" (Fins, 2008).

COUNTRY	FREQUENCY (N)	FREQUENCY ADJUSTED BY POPULATION (PAPERS PER MILLION)
USA	342 (35.4%)	1.2
CANADA	30 (3.1%)	1.0
UK	41 (4.2%)	0.7
GERMANY	49 (5.1%)	0.6
FRANCE	28 (2.9%)	0.5

Table 1: Absolute number of publications and number of publications adjusted by population from 1989-2007. Based on original data from 1989-2005 (Lomber and Illes, 2008) and updated to 2007.

Methods

We designed a 3-part, 13-point survey based, in part, on Conti and Corbellini (2008) to examine neuroscientists' perspectives on ethics in their professional environment. We collected data at a major professional meeting of the target cohort -- the Canadian Association for Neuroscience (CAN) -- in May 2008. All Confidence Intervals (CI) reported at the 95% level.

Results

- N=201 (18% of conference attendees)
- 50% male; 50% female

Professional Level	N (%)
Graduate Student	131 (65.5)
Postdoctoral Fellow	27 (13.5)
Faculty	18 (9.0)
Undergraduate student	11 (5.5)
Research staff	7 (3.5)
Other	6 (3.0)

Table 2: Professional level of respondents

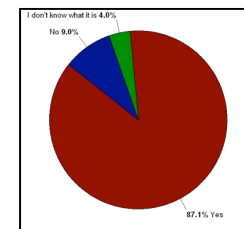


Figure 1: General interest in neuroethics

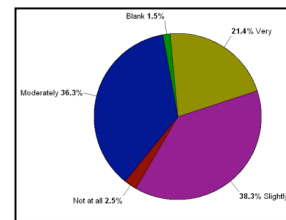


Figure 2: Interest in more opportunities to discuss neuroethics

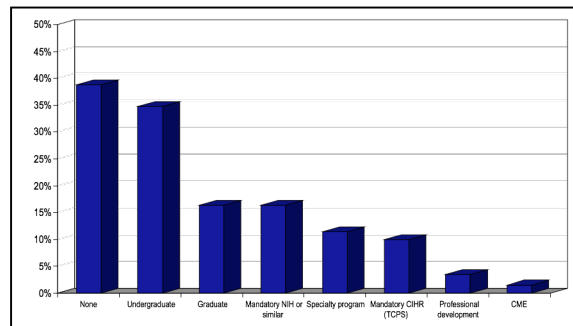


Figure 3: Ethics training reported by respondents. Of those reporting no ethics training, 60% were graduate students.

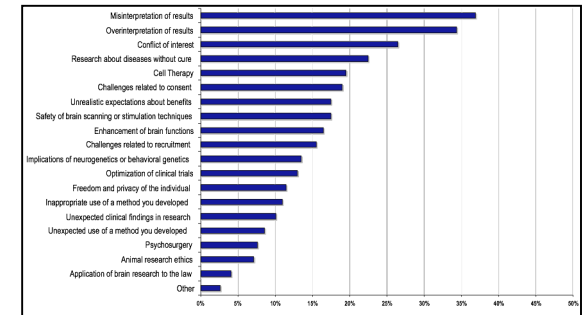


Figure 4: Ethics concerns arising on a regular basis

Interpretation and Conclusions

With the significant investment that Canada has made in neuroethics and the growing place of the field on a global scale, establishing metrics and understanding the engagement of neuroscientists in the field is key. Our data suggest that although interest is high in Canada and there is an awareness of a significant number of challenges that may be considered to be ethical in nature, current approaches to ethics training are not meeting the needs and interests of the cohort.

These findings suggest that greater neuroethics education and outreach efforts are needed in Canada. An interdisciplinary approach to curriculum development that involves scholars from the neurosciences and other academic backgrounds will maximize the efficacy of the educational resources developed to meet this need. Our data suggest that graduate level neuroscience training will be a strong entry point nationally and for appropriately tailored programs internationally in the future.

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