But morality isn't just in the lone head. Context matters a great deal to becoming moral, and becoming more moral. One's own social context and place in historical time exert considerable influence over which concepts and constructs of moral rectitude are held in highest regard. Moral abilities are not inborn at full capacity; rather humans learn to become moral members of society[16-18]. Moreover, no matter which ethical code is preferred when one is an adult, there remains much situational variability in how moral judgments are formed on a moment-by-moment basis. It appears that to at least some extent, human moral cognition entails multiple modes of moral discernment and ethical justification[19-21]. Both utilitarians and deontologists, for example, can find human brains (and often the same brains) that are able to assess crafted moral situations according to theoretical expectations[22,23]. From neuroscientific, psychological, and sociological standpoints, then, the stance of moral pluralism is acquiring plausibility – "morality" is just a conventional covering term for quite distinct modes of judgment and ways of conduct, each finding a way to contribute to individual and social flourishing[24].

Moral Enhancement

Neuroethics takes into account the neuroscience of morality while undertaking its second main task: addressing the ethics of modifying brain structure and function. With ongoing developments in neuroscientific techniques and technologies, there is increasing interest in, and discourse about using such approaches to alter moral thought and behaviors[19,20]. The notion of moral "enhancement" typically evokes positive and even utopian hopes about peaceful and just societies.

However, ends don't always justify means, even in ethics, especially if ends are only vaguely conceived. So, while elements of a "common morality" for adults have been proposed[25], and perhaps components of this morality discerned among all the particularities of culture, there is no universal standard for what concretely counts as ethical conduct, beyond a few moral platitudes we expect children to follow. Constructs of a "golden rule" are applicable in part[26], but there are abundant examples of intentional violations of the "do unto others" maxim.

So , if the goal is moral enhancement, such a task couldn't simply amount to adjusting brain function to better conform to some cognitive pattern approved by one or another theory of ethics. As the previous section recounts, no theory about some essence to morality is surviving scrutiny by moral neuroscience or moral psychology. Only the strictly empirical route remains secure. Having a pre-approved set of moral behaviors already in hand, and letting neuroscientific investigations discern correlations between those behaviors and neural function, it is possible to infer that modifications to certain neural processes would affect moral behaviors (but in potentially unexpected and unwanted directions).

Before any techniques are employed for "moral enhancement" the first steps should entail specifying what counts as "moral" conduct to be attained, and ascertaining which cognitive processes can be targeted for modification to thereby "improve" that designated moral conduct. Moral enhancement through neural modification could never be species-wide, trans-historical, or aligned with just one moral theory, for reasons already discussed. At most, local and provisional moral improvements could be developed that target specific kinds of behaviors in highly limited ways, not unlike advances in pharmaceuticals.

Still, neuroethical discourse should not dismiss the idea of moral enhancement as entirely unrealistic. There are many considerations and constraints to any type of biologically-induced treatments that are posited to represent enhancements or optimizations that must be seriously taken into account[31]. Achieving measurable moral improvement would necessitate meaningful deliberation about what morality is, and which moral precepts and standards are of most value. Of course, each culture already harbors its own views about moral rules and ethical priorities.

Neuroethical address therefore reaches a stage where two paths diverge. The first path allows moral psychology and moral enhancement, to vary from culture to culture (and likewise for sub-cultures). What counts as moral enhancement accordingly varies across societies, so that moral relativism corresponds with relativism for enhancing morality. On this path, neuroethics is splintered and divided by cultural preferences. The second path encourages moral psychology to seek what is common to all human morality. What counts as moral enhancement would be the improvement of moral capacities common to our species that support any culture's cohesion. On either path, there is no destination that enables arriving at some neuroscientific determination of what is "really" moral, or some verdict by moral psychology about which cultures are more moral than others. Brain science can never do the work of ethics. However, if neuroethics is highly multi-disciplinary and sensitive to inter-cultural deliberations, then the future of moral enhancement could contribute to the greater civility and harmony that any society should seek.

Discussion

Neuroethics will be a successful discipline to the extent that its two main tasks concerning human morality are continually coordinated and adjusted to each other as neuroscience progresses. This calls for neuroethics to be thoroughly neurophilosophical, and less beholden to

false dichotomies behind dire headlines about morality's evaporation. As Wiseman has noted, what may be drawn from attempts to depict neuroanatomical loci and networks that subserve moral thought and action is that such construals of a "moral brain" represent a "myth", in the most literal sense as *mythos* (μῦθος) – an explanatory story, typically based upon limited information. We concur, and add that denoting something as mythic need not be pejorative. As matter of fact, a myth can serve to represent partially understood truths, convey profound meanings, and serve object lessons.

A key truth is that the human brain evolved to manage an intensely social life with predispositions favoring joint cooperation and group solidarity[27,28]. The prevalence of norms and rules, and more rules about enforcing important norms, is quite characteristic of our species. However, that truth can be twisted into falsehood by further assuming that human brains are hard-wired to be moral. Predispositions for sensitivities to certain socially relevant cues that are important to individuals' interactions, survival and flourishing in groups appear to have been developed and preserved as a consequence of hominid evolution. If "morality" is taken to mean anything more specific than that, then one would be talking only about socio-cultural constructs, not human nature. No specific moral code is inherent to humanity, although developing some sort of moral mindset and instilling it in the young, which every culture accomplishes, is as naturally human as anything else.

The human capacity to create and sustain particular cultures is always deeply at work. Let us not forget that individuals constitute cultures, and their psycho-social interactions affect and are affected by the structure and function of their brains. Do brains engage in cognitions and decisions that evoke behaviors that may be considered to be "moral" and/or "ethical"? Absolutely; and therein rests the truth in the myth. Are there nodes and networks that are *exclusively* functional in moral thoughts and actions? It seems not. But brains are embodied in individuals who are nested in, and interactively responsive to their environments. Indeed, the merging of experimental neuroscience and cognitive science may provide new methods – and ways – of understanding and predicting the relationship of neural activity and cognitive dynamics in attempts to afford a bridge between the brain and its functions that are categorized as the "mind"[28].

And here we encounter the pragmatic temperance of the *mythos* of a moral brain by the *logos* (λόγος) – the rational discourse – of neuroethical investigation and deliberations about using the tools and information of the brain sciences in ways that preserve the realistic capabilities of techniques employed, and the facts (and persistent unknowns) of the information obtained. This is the core significance of "an ethics of neuroscience" (i.e.- neuroethics' "second tradition"), and the key to insuring the validity and preserving the value of any attempts at, and information gained from a "neuroscience of ethics".

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