Can a line be drawn?

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From identifying neural correlates of belief formation, to cognitive enhancers, neuroscientist Michael Gazzaniga advocates a brain-based philosophy of life in his novel, The Ethical Brain, which can end the tug of war on ethical issues, plaguing society. Opponents, however, claim that it will only strengthen the divisive forces within society. Contrary to Gazzaniga's praise of cognitive neuroenhancers, Cheung and Pierre (2015) of the psychiatry department at UCLA argue, "motivations for… cosmetic and cognitive enhancement may overlap with common core social needs… [to] compensate for self-perceived deficits or to feel better about oneself" (111-112). Although unlocking neurological mechanisms may initially elicit perfection and selectivity, Gazzaniga presents arguments that emphasize long-term benefits of examining the brain, allowing society to understand one another. Although society cannot achieve universal ethics, neuroethics can help individuals understand existing differences and decrease hostile behavior.

Neuroethics could increase cooperation by allowing one to gain a new perspective, improving his or her judgements. One can understand distortions in incoming information. Despite our reliance on them, Gazzaniga contends that memories are not reliable. Our brains are subject to undergoing different types of memory distortions such as blocking and misattribution, which can have neural correlates. For instance, a study that measured the duration and strength of electrical signals of volunteers listening to words revealed that signals in the posterior part of the brain (involved in visual processing) were more positive when the words would later be remembered falsely, demonstrating that mental imagery can create false memories (Gazzaniga, 126, 138-139). Even highly superior autobiographical memory individuals (HSAMs) are subject to memory distortions. At the University of California, Irvine, Patihis et al. (2013) demonstrated HSAM's "susceptibility to memory distortions…misremembering nonexistent news footage when misleading imagination exercises were given" (20950). Understanding distortions within information received could decrease incongruence of ideas within society, as people would be forced to reconcile multiple sources before jumping to conclusions.

Additionally, one can increase cooperation within a group by establishing guidelines that can prevent hostile attitudes should differing views arise. Contrary to deterministic views, Gazzaniga advocates the brain's adaptability to morals set by society: "the brain is an evolved system, interact[ing] with its environment…allows it to learn rules to govern how it responds" (101). Moreover, Yang et. al (2015) identified neural correlates of the withdrawal reflex in Aplysia. The HCN ion channel enhances the NMDA receptor current necessary for Hebbian potentiation, contributing to learning the withdrawal reflex (16034). Evident in this study is the neurological changes in the brain during learning. Moreover, Gazzaniga states, "…the idea of responsibility, a social construct that exists in the rules of society, does not exist in the neuronal structures of the brain" (102). According to Gazzaniga, examining the brain's plasticity, allows one to understand that the individual is not restricted to his or her pre-wired brain: the brain constantly adapts in different situations. Thus, new ideas and morals can be established within society because individuals can adapt to the social environment. Since groups are the basis for establishing rules and ideas, society can mold ideas such as respect and cooperation into a social construct, ultimately enhancing different ways of thinking and decreasing hostile attitudes. Increasing interaction of different cultures is also critical to cooperation.

Cognitive enhancers can facilitate learning a foreign language, uniting groups of people together. A barrier to sealing the language gap is the difficulty to grasp languages as one ages. Granena and Long of the University of Maryland (2012) conducted a study to test the "timing of maturational constraints in three linguistic domains" noting that there is a sensitive period (SP) for phonology, and syntax, offset at ages in childhood (311, 336). Cognitive enhancers, though, can break down this language barrier by enhancing synaptic plasticity. For example, depolarizing GABA is essential in prolonging the critical period. The capacity for synaptic plasticity declines when an "inhibitory threshold is reached" (Fagiolini-Hensch, 2000, p. 183). According to a study by Porcher et. al (2010), depolarizing GABA maintains the critical period by triggering the release of brain-derived neurotrophic factor (BDNF): a neurotrophin that is responsible for growth and plasticity of neurons (21674). Recently, Deidda et. al (2015) concluded from their study that "early depolarizing GABA exerts a long-lasting modulation of plasticity…by a strong crosstalk with BDNF" (7). Prolonging the critical period by increasing synaptic plasticity and bypassing genetic predispositions to achieve one's full potential (Gazzaniga, 60), could increase language learning and foster cultural interaction. Increased cultural interaction offers individuals a new perspective on ethical dilemmas and can unite people together. Likewise, one can understand different modes of thinking that are generated by certain cultural upbringings.

Despite the objective facts in neuroscience, most solutions to ethical dilemmas are social constructs rather than biological facts. Despite Gazzaniga's attempt to use consciousness to justify euthanasia, "it feels impossible to identify a point at which a deteriorating or deranged brain becomes undeserving of normal moral status" (32). More so, incongruence between feelings and facts exists. Up till 23 weeks, a human fetus cannot survive, yet the heart begins beating around 18 days. Gazzaniga himself has mixed feelings regarding the issue of abortion from his scientific and fatherly perspectives (7-8). Thus, universal ethics cannot be achieved due to the subjective nature of issues facing society. However, neuroethics could motivate people to utilize neuroscientific evidence before forming stereotypes or coming to irrational conclusions: factors that increase the divisive forces within society. For example, sex differences can be explained neurologically. To illustrate, gonadal hormones influence early brain development and modulate adult physiology and behavior. Nirupa Goel and Tracy L. Bale of the department of Animal Biology at the University of Pennsylvania (2008) administered testosterone propionate (TP), a male hormone, to rodent models and found that "activational effects of TP in females resulted in significantly decreased corticosterone to levels like males" (6402). This study implies a scientific explanation to why women are considered, "more emotional." By understanding the neurobiology of behavior, individuals can comprehend the diversity of thinking and why certain ideas may be important to others. Neuroscience won't cause society to abandon an idea for another. Instead, learning neurological mechanisms will allow individuals to reconcile different ideas and decrease tension within the community.

While neuroethics cannot be achieved, the long-term effects of incorporating neuroethics in society can help individuals reconcile existing differences and decrease hostile behavior. Current research sheds light on using neuroscience and reinforces Gazzaniga's ideas. Memories are not reliable. The brain is a plastic entity that constantly changes structurally and can be influenced by the environment. Drugs that increase synaptic plasticity can help erase divisive forces in society, contrary to the arguments presented by Cheung and Pierre. Neuroscience can glue back together the current rips in society by smoothing out rough patches, erasing hostile attitudes, and molding a new perspective on the situation. Perhaps morals won't ever be scaled to fit a homogenized moral system known as universal ethics due the internal battle of feelings and facts. But even though the line cannot be drawn, society can still paint a world that is more respectful and accepting of differences, creating a long-lasting image.

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