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Review: *The Ethical Brain*, by Michael Gazzaniga

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Envision this scene: Socrates sits in prison, calmly awaiting execution, passing the time in philosophical discussions with students and friends, taking the occasion to inquire into the fundamentals of ethics: Where do moral laws come from? What is the root of moral motivation? What is the relation between power and morality? What is good? What is just?

Ever modest, Socrates confesses ignorance of the answers. The pattern of questioning strongly hints, however, that whatever it is that makes something good or just is rooted in the nature of humans and the society we make, not in the nature of the gods we invent. This does not make moral rules mere conventions, like using a fork or covering one's breasts. There is something about the facts concerning human needs that entails that some laws are better than others.

From the time of Socrates to the present, people have sought to give a natural basis for morals-that is, to understand how a moral statement about what ought to be done can rest on hard facts, albeit facts about conditions for civility and peace in social groups. How can ethical claims be more than mere conventions? How can such claims be rooted in facts about human nature but have the logical force of a command?

Developments in evolutionary biology have helped to explain the appearance of moral motivation in humans and in other eusocial animals-animals that display behavior involving cooperation, sharing, division of labor, reciprocation and deception. In these species, various forms of punishment (shunning, biting, banishing, scolding) are visited on those who threaten the social norms. Ethological studies help us appreciate that, at a basic level, human social behavior has much in common with that of other species.

Developments in neuroscience hold out the promise of extending the naturalistic perspective to aid in the understanding of how the brain and its circuitry underlie the capacity to learn social norms and to behave in accordance with them. Many of us ponder the possibility that discoveries about brain function and organization will challenge the conventional wisdom on

which our system of justice relies and will allow us to see more deeply into the biology of social behavior, including moral behavior. In his new book, The Ethical Brain, Michael S. Gazzaniga takes an unflinching look at the interface between neuroscience and ethics, and offers his own thoughtful perspective on some of the tough questions.

As a graduate student at Caltech, Gazzaniga studied under one of the towering figures of neuroscience, Roger Sperry, whose lab pioneered research into the cognitive effects of cutting the fibers connecting the two cerebral hemispheres (a procedure used to treat intractable epilepsy). Ingenious testing of these so-called "split brain" patients revealed that their two brain hemispheres operated independently, each hemisphere acting almost like a distinct person. These were profoundly important results, both for philosophy and for neuroscience. Gazzaniga went on to explore the neurobiology of higher mental functions-attention, memory, choice, consciousness-more generally, always with a philosophical question biting his heels. He currently serves on the President's Council on Bioethics. Thus it is especially fitting that he should now pen his thoughts on neuroethics.

The most fundamental neuroethical issue concerns free will and responsibility. The mind is what the brain does, and the brain is a causal machine. Consequently, deliberations, beliefs, decisions and ensuing behavior are the outcome of causal processes. Typically, the causal processes leading to awareness of a decision are nonconscious. The "user illusion", nevertheless, is that a decision is created independently of neuronal causes, by one's very own "act of will". Some philosophers-usually called libertarians-resolutely believe that voluntary decisions actually are created by the will, free of causal antecedents. Like flat-earthers and creationists, libertarians glorify their scientific naiveté by labeling it transcendental insight.

Gazzaniga, like many a philosopher, realizes that it would make a mockery of the criminal justice system if the accused could escape punishment simply by pleading that the brain is a causal machine and hence he or she lacked free will. So when and how ought we to hold people responsible for their behavior?

Gazzaniga's answer has two components: First, he claims that we hold a person responsible, causality notwithstanding, so long as his or her behavior was unconstrained-so long as the person could have done otherwise. Second, Gazzaniga identifies responsibility as a social, not a neurobiological, property. His point is that our institutions for assigning responsibility derive from the need to maintain and protect civil society, which must figure out suitable criteria for when and how to punish those who violate the rules.

Gazzaniga sums up his solution to the problem of free will by saying that "the brain is determined, but the person is free". The logic of this brain/person duality is not particularly compelling, or even coherent, yet as Gazzaniga's writing implies, it may be in our collective interest to live by this dualistic legal fiction.

The obvious test of the "let's pretend" solution is to see whether it can specify relevant criteria for distinguishing between those who could have done otherwise and those who could not have, and between those cases in which mens rea (literally, a guilty mind) obtains and those in which it does

not. (Mens rea is a criminal law concept requiring proof that the mental state of the accused was such that he or she committed the crime purposely, knowingly, recklessly or negligently; strict liability, in which state of mind has no relevance, is fairly rare in criminal law.) Here, however, the wheels fall off Gazzaniga's solution.

Worried that ever-cunning defense attorneys will try to extract more exculpatory mileage out of neuroscience than the facts can support, Gazzaniga magnifies the incompatibility of responsibility as applied to persons and the causality that governs functions of a person's brain. He says, "The issue of responsibility . . . is a social choice. In neuroscientific terms, no person is more or less responsible than any other for actions." This implies that there are no relevant factual differences between someone with, say, obsessive-compulsive disorder and someone who can resist impulses. Can this conclusion be right? As the British neuroscientist Steve Rose has pointed out, badness, just as much as madness, involves the brain.

The flaw in Gazzaniga's argument is that although responsibility is assessed in a social context, the capacity to learn social norms and the capacity to act in accordance with them are matters of individual brain function. It is precisely because an important difference exists between a normal brain and the brain of someone who is seriously demented or unreachably deluded that such people are not considered responsible for crimes they might commit. Moreover, judicial institutions rely on threat of punishment to deter. The late maturation of the prefrontal cortex (with reference to neuronal density, synaptic density, dendritic length and myelination) means that the brains of mature adults are critically different from those of young children-which almost certainly accounts for the child's more modest ability to appreciate the consequences of his or her choices and to resist temptation.

Satisfied that the brain/person duality is workable, Gazzaniga pushes the hypothesis further. He says that because assignment of responsibility is a social matter, not a matter of fact about the brain, neuroscience cannot possibly "settle" whether a person is responsible. Granted, determining legal responsibility is complicated, and neuroscientific knowledge cannot be substituted for knowledge of the law and of community standards. What kicks up sand, however, is the unfortunate choice of the word settle. Neuroscientific evidence can surely be relevant, even if the disposition of the case is settled by members of a jury whose brains follow some form of constraint-satisfaction algorithm. Yet Gazzaniga resolutely insists upon the stronger point: Neuroscientific data are not even relevant.

Why not? His reasoning goes like this: As a group, schizophrenics, for example, are no more prone to violence than individuals in the general population. Ditto, he says, for people with prefrontal lesions. If a given schizophrenic, Mr. Jones, kills someone, it is mere theater to display his brain scans in court, picking out some abnormality or other as "the cause" of his homicidal behavior. There are no relevant differences that neuroscience knows about that can explain why Jones killed, but Smith (also schizophrenic) did not. Not everyone with low glucose levels engages in violence; not all citizens raised in an inner-city hell become drug dealers; not all premenstrual

women beat their children. We can assume there are differences in the brain, but whatever these differences happen to be, they are not, he believes, relevant to determination of responsibility. Why? Because there is no "responsibility" area whose functionality can be examined through a scanner or with electrodes-not now, not ever. Responsibility is a social construct, not a brain function. This point, he believes, holds generally-for schizophrenics, for patients with prefrontal cortex lesions, and so forth. And for good measure, he suggests that the insanity defense itself is too imprecise and problematic to be of practical value.

It is widely expected that neuroscience has, or soon will have, something to say about competence to stand trial, about whether the mens rea condition has been met and about appropriate sentencing. Thus Gazzaniga's bold thesis raises important concerns. I share his worry that defense attorneys and hired experts from neuroscience may get out in front of what current science can honestly say-it's bad enough that venal psychiatrists have sown wholesale distrust of their discipline by selling their "expertise" to the highest bidder. On the other hand, perhaps Gazzaniga overstates the case.

Consider the Virginia man who at around age 40 became obsessed with child pornography and eventually molested his eight-year-old stepdaughter. He had no previous history of pedophilic inclinations, and his interest in child pornography completely disappeared with the surgical removal of a tumor of the frontolimbic system, which had invaded the hypothalamic area of his brain. Along with other appetites, sexual drive is regulated in the hypothalamus. Some months later, when the tumor grew back, his preoccupation with pornography returned, only to vanish again with repeat surgery. Because the waxing and waning of his sexual compulsions corresponded to the waxing and waning of the tumor, his was not a standard molestation case. So long as his limbic structures are tumor-free, it seems rather pointless to punish him for a pornographic pursuit that was alien to his character. Punishment would not make sense either as deterrence or as retribution.

Consider a more complicated discovery. In a landmark longitudinal study in New Zealand that followed the lives of about 500 men from infancy to about age 26, a significant subpopulation showed a strong and unmodifiable disposition to engage in antisocial behavior, including irrational and self-destructive violence. Genetic analysis revealed that most of the men in that subpopulation carried a mutation for a particular enzyme, monoamine oxydase A (MAOA). The enzyme metabolizes three neuromodulators (serotonin, norepinephrine and dopamine, all of which are relatively concentrated in prefrontal areas of cortex), thereby inactivating them. Environment was also a factor: In the group with the MAOA mutation, the criteria for adolescent conduct disorder (a measure of antisocial behavior) were met in about 85 percent of those who had been severely maltreated as children, in about 38 percent of those who had probably been maltreated and in only about 22 percent of those who had not been maltreated. Among those who did not carry the MAOA mutation but had been severely maltreated, only about 42 percent had the conduct disorder.

These findings are preliminary, and further research is needed on the

exact nature of the effect of early maltreatment on the circuitry affected by low MAOA levels. Still, on the face of it, the capacity of maltreated children with the MAOA mutation to acquire and act on social norms appears to be diminished. If Gazzaniga is right, however, these data are irrelevant to determining responsibility. The fact that the men are irrationally violent means that society needs protection from them-fair enough. Even so, it is important to distinguish between custody and punishment. Why? For the sake of the integrity of the institution of justice, because as a social institution, the criminal sanction depends on broad social support to keep functioning properly. When the criminal sanction is applied to cases that violate common beliefs about fairness-to young children, for example-support is replaced by resistance and reform. In order to be broadly accepted, the legal fiction that the brain is determined but the person is free will have to make peace with the widespread conviction that because of brain abnormalities, we are not all equally masters of our fate.

On other bioethical issues, Gazzaniga is just as forthright. The book begins with a discussion of the medical use of embryonic tissue and the debate over whether a blastocyst (which is a ball of a few hundred cells) is a person. This section is thoughtful, clearheaded and informed by developmental neuroscience. One fallacy Gazzaniga exposes depends on the common idea that graded differences block principled legal distinctions. In the version referred to as the fallacy of the beard, the logic goes like this: If we cannot say how long a man's whiskers must be to qualify as a beard, we cannot distinguish between a bearded man and a clean-shaven one. Although this form of argument fools nobody on the topic of beards, it has been seductively employed elsewhere, especially regarding embryos. Criticizing the blastocyst-as-baby argument, Gazzaniga sensibly points out that we can draw a reasonable, if imperfect, line. When a distinction is needed, we devise laws that draw one, typically erring on the side of caution, given prevailing community attitudes. There is no precise moment at which a child becomes an adult, or a blastocyst becomes a sentient person, but reasonable humans unencumbered by superstition can nonetheless come together to "draw a line", and we can redraw the line when the facts merit a revision. Eighteen as the age of majority is not the perfect line for all adolescents, but on the whole it works well enough.

Gazzaniga also presents an eloquent defense of personal choice in end-of-life matters, while recognizing that there are bound to be fundamental differences across people regarding euthanasia. Most people understand the concept of brain death and see the wisdom in equating death with brain death. In large part, this acceptability may be owed to personal experiences concerning the remarkable benefits conferred by organ harvesting.

Other topics covered, if not fully, then sufficiently well to provoke thought, concern the neurobiological and evolutionary explanations of religious beliefs, in all their amazing variety and conflicting manifestations. Gazzaniga discusses also the remarkable nature of autobiographical memory, and the susceptibility of memory to suggestions, reconstruction, invention and wholesale confabulation. Because it is brief, compelling and free of technical

jargon, the whole book can be easily read during a transcontinental flight.

At a time when intellectuals may feel cowed by the heavy hand of the fervently religious, it is a relief to see that Gazzaniga neither shies away from controversial opinions nor waters them down so as to offend nobody. At the same time, he is respectful of moral convictions that do not line up with his own. His opinions are delivered not as dogma but as part of an ongoing reflection and conversation, in which seeing all sides of a moral problem is itself regarded as a moral achievement.