Legal and Social Implications of Predictive Brain Machine Interfaces: Duty of Care, Negligence and Criminal Responsibility

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Neuroscience has taken us even beyond the ability to predict the onset of a seizure. Recent research has shown that brain-machine interfaces (BMIs), particularly those associated with neuro-prosthetics, and especially those situated in the brain’s posterior parietal cortex (PPC), can tap into subconscious thought.¹ This technology has the ability to even predict and trigger user actions —ostensibly to prevent lurching, jerky and/or delayed prosthesis motions— even before that user consciously knows that they are going to make them.²

These and other BMI systems raise legal and ethical concerns perhaps more disquieting than patient autonomy and privacy. In particular, the very practical, and likely soon-to-be-pressing, issues relating to the ethical and legal duties associated with tort and criminal law. For example, legal and regulatory systems will need to deal with BMI associated human enhancement technologies such as exoskeletons³ or prosthetics⁴ that, as a result of unanticipated subconscious thought cause harm to their users, others or property. Even more nefarious, the BMI could be hacked such that a set of actions are maliciously forced on the user.

This isn’t just a far dystopian future: Although BMIs still suffer from high levels of false positives and false negatives, the microchips in the aforementioned PPC experiments are now commercially available and they are even approved for human use.⁵ And, Panasonic, for example, promises relatively affordable consumer exoskeletons by the end of 2015.⁶

And it’s not just the use of PPC BMI implants that are potentially problematic. With many prosthetics incorporating artificial intelligence technologies,⁷ we will likely see a further muddying of the waters in deciphering who or what actually caused the resulting offensive actions, an important legal determination. These issues are likely not going to

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be limited to just the disabled community: otherwise abled individuals could use this technology in the military, heavy-industry and other areas.

Although BMIs could fall within nascent field of robot law—like robots, they obtain information in the form of electrochemical neuronal signals, they interpret these signals through complex algorithms, and then output a signal to an effector that may result in a perceived action— however, in contrast to other areas of robotics law, PPC BMIs raise additional and unique concerns: In addition to all the standard relevant stakeholders including the programmers and manufacturers, the law must account for the confounding additional element of the potentially subconscious integrated user who introduces substantial uncertainties typically associated with all biological systems, uncertainties that are further confounded by potentially unpredictable artificial intelligence.

US tort and criminal law, although at one point doctrinally aligned, differ significantly in a number of key areas, particularly in the spectrum of potential states of mind necessary for culpability and the minimal level of fault necessary for that culpability. Significantly, US law distinguishes between the nature of intent necessary to find someone liable for an intentional or a negligent tort, and the nature of intent necessary to find the requisite mens rea (criminal intent) in a criminal cause of action.

More specifically, tort law relies on the premise that we can be held responsible for our actions, as per an objective reasonable person test, regardless of our personal limitations and foibles. Moreover, even when both parties are relatively innocent and neither are morally blameworthy (as distinct from at fault – where only in cases of strict liability is the law unconcerned with fault), the party that proximately caused the injury is, by public policy fiat, nevertheless liable, and the injured party must be made whole.

In contrast, criminal liability is associated with socially proscribed sanctions against morally wrong actions. Put more specifically, if I perform a morally wrong action, say speeding, but don’t harm anyone, I am not liable under tort law. However, I could be liable under criminal law. In the area of torts, the law looks to the ‘but for’, proximate,
or ‘substantial factor’ causative action, without necessarily a concern for moral considerations, or even intent. In criminal law, the law also assesses the moral character of the actor herself in assigning the necessary blame.

Returning to BMIs, looking just to the issue of causation, a vicarious liability system, where the user has knowledge and some control over the BMI, can be used to assign responsibility — similar to parent-child, owner-pet, and employer-employee relationships. This per se responsibility for the actions of your wards can also incorporate your subconsciously controlled prosthetic. While a more suitable biological comparison may be Alien Hand Syndrome — a neurological condition in which the afflicted patient’s hand acts in a non-volitional manner resulting in complex even damaging behaviors — unfortunately there doesn’t seem to be any relevant case law.

Pushing this further, under tort law, the fact that you strapped on a prosthetic coupled to a BMI that reads off your subconscious thought, would likely not negate your liability. But that liability can still be shared with the above mentioned stakeholders, e.g., the manufacturer, the programmer, the physical therapist, and others associated with providing you with a working product.

To some degree, courts may want to chase the deeper pockets of the manufactures when something goes wrong with the PPC BMI software under a strict liability doctrine. However, with courts still unclear as to whether software is a product or a service, there hasn’t been a consistent application of strict liability to software tort law, as would be the case in most other torts involving products. As such manufacturers could rely on a ‘state-of-the-art’ defense arguing that the current state of the art of PPC BMIs will lead to some errors in interpreting the brain’s signals. Further, courts may loathe to disincentivize research and development by overly onerous product liability rules for BMIs.

Perhaps an optimal system for at least the early stages of BMI commercialization might include a federally mandated insurance fund to cover torts caused by a misreading of
subconscious thought. Incorporating a ‘Black Box’ may also help in determining whether the user actually intended to cause the tort as would additional technological safeguards, but both raise issues of privacy and/or the circumvention of free will. Rather, like a sleepwalking defense, the user would have to somehow provide evidence to disprove the arguably more believable scenario.

The application of criminal law could be even more convoluted. The Model Penal Code, §2.01, recognizes only an arguably antiquated binary version of voluntary (liable) or involuntary (e.g., automatism; not-liable) acts. Section 2.02 requires that the criminal act be done with a minimal level of intent. Another binary option: the long-standing maxim that you cannot be punished unless you at least had some conscious choice to do something wrong, or unconsciousness. Defense of an otherwise criminal action can rely on either or both the automatism or unconsciousness defenses.

To this end, some concede that the criminal justice system would not apply in instances wherein your conscious brain is only a secondary player after the initial subconscious unintentional action. Others suggest that there ought to nevertheless be criminal liability when necessary for the furtherance of justice.

The BMIs discussed herein fall into an uneasy middle-ground. The actions may be the unconscious thoughts of a conscious individual performing a desired but involuntary action, all resulting from the conscious use of potentially, albeit remotely, risky tool. There are no simple solutions, but revised laws that better incorporates more current understandings of neuroscience would be a step in the right direction.