



Case Studies in Neuroethics

Developed by the CSNE Neuroethics Thrust at the University of Washington

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Case 1: DBS at the dinner table

written by Tim Brown and CSNE Ethics Thrust

Harold has an overeating problem and a sedentary lifestyle. As a result, he is morbidly obese and, as a result, he is headed for many health complications: cardiovascular disease, diabetes, and mild depression. His physician warns him that his symptoms will worsen if he does not change his eating habits. He has tried several diets, exercise regimens, and even an appetite suppressant (Lorcaserin) with no results. Due to prior abdominal surgery, gastric bypass surgery is not an option for him. Harold's physician learns of an experimental treatment for impulse control disorder (ICD) available at a local hospital: a deep brain stimulation (DBS) device can be used off-label to control Harold's cravings. Harold is referred to the local surgeon and after a long discussion agrees to have the device surgically implanted. His results are substantial: he no longer craves food the way he once did, and he's able to control his portions. He slowly begins to lose weight.

Harold has noticed that he no longer *desires* food the way he once did and mealtimes have become more like a chore than anything else. The food tastes the same, but he no longer looks forward to it. He misses the excitement of looking forward to a good meal and despite his weight loss begins to regret his choice of DBS. He is afraid to admit any of these sentiments to his family or friends; they have stigmatized obesity before, and he is afraid of provoking any more criticisms of his relationship to food. He doubts that they will understand that he now feels like he has given up something intimately connected with his sense of self – his identity. He wonders if he should discontinue the DBS and try to “get his old self back”.

Questions:

- *Is Harold merely experiencing a conflict between two things he wants (i.e., to be thin and to enjoy food) that are incompatible for him or is he experiencing something more fundamental – a loss of identity. What does it mean for something to be a threat to identity and how important is this?*
- *Is Harold's problem mostly just a “weakness of the will” that he should take responsibility for, rather than seeking treatment? If Harold was addicted to heroin, would we be open to his concerns about losing a part of his identity (as someone that enjoys drugs). Why or why not?*



- *Do you worry that Harold feels undue pressure (by family, friends, his provider, society) to undergo and continue treatment? Could his decision to keep or discontinue the DBS be autonomous despite feeling pressure from people who care about him?*

Case 2: A little help here?

written by Tim Brown and CSNE Ethics Thrust

Janet is a high school student in her junior year. Her advisors and mentors have warned her to prepare for college as early as possible, and Janet is not one to procrastinate: she's signed up to take her ACTs and SATs, she tries doubly hard to earn high marks in all of her classes, and she is signed up to volunteer for a local charity organization. Lately, however, she is finding it difficult to keep up: she has trouble focusing on her studies, and (once she focuses) she finds that she takes longer than she'd like to comprehend the material she studies. One of her classmates recommends that she try a device — a transcranial direct current stimulation (tDCS) headset. The device's website and advertising materials claim that it will help her concentrate on her work for longer and think more efficiently. The device works by applying a weak electrical current to the user's prefrontal cortex for a period of time determined by the user. Janet's classmate is willing to lend Janet her device for a few weeks.

Questions:

- *Is it fair for Janet (or her classmate) to use this device? The price of the device is fairly high—\$249. Do Janet and her classmate have an unfair advantage over their peers?*
- *Is using a device like this any different from other ways of changing brain function, for instance drinking coffee or taking prescription drugs like Adderall?*
- *Should the device be considered a “medical” device or a non-medical enhancement? What if it ALSO can be used by people with dementia to help their memory?*
- *Would you think less of someone who used such a device to accomplish something important (e.g., make a medical discovery)?*
- *Some people who have used tDCS have experienced headaches, brief loss of consciousness, and even temporary blindness. How should the potential benefits of tDCS treatment be balanced against the risks?*



Case 3: Hacking the Presidency

written by Katrina Lane and CSNE Ethics Thrust

Eric Jones disclosed his diagnosis of mild early Parkinson's Disease during his first presidential run 7 years ago. Now, in the middle of his second term as president his tremors and slow walking have been getting worse. Medications have ameliorated his symptoms well in the past, but are increasingly less effective. Jones' doctors recommend DBS for treatment of his worsening motor symptoms. Jones consults his family and top advisors. His wife wants him to undergo DBS now to improve his motor functioning while in office. She is particularly worried about stigma associated with Parkinson's symptoms and what effect this may have on his legacy as a strong leader. The Secretary of Defense is adamantly opposed to DBS, citing security issues. She is concerned that the device could be hacked, putting the President's health, and in turn the country's security, at risk. Jones' doctor tells him that it would be possible to do the procedure without informing the media.

Questions:

- *Should Jones have to disclose whether he is getting a DBS? Why or why not?*
- *Sometimes DBS can have side effects, such as causing depression or obsessive behavior (e.g., gambling). Does this change your view of whether Jones should be allowed to get a DBS? Does it change your view of what Jones should have to disclose to the public?*
- *What if Jones were an airline pilot? Neurosurgeon? Truck driver? Teacher? Should the level or type of responsibility of one's job influence whether one can get a DBS (or other biomedical device that might be "hack-able") or what has to be disclosed and to whom?*



Case 4: The power of memory

written by Sami Ayele and CSNE Ethics Thrust

Dawit, a 53 year-old Ethiopian immigrant, is visiting a hospital on the behest of his employer, a taxi company. Recently, he has shown symptoms of PTSD — flashbacks, depression, and hypervigilance. Once triggered, he hyperventilates and feels “paralyzed” by fear —as if frozen in time. As a taxi driver, he is liable for any damages upon the car and patrons; because of this, his concerned employer connects him with a free consultation at the local university hospital’s immigrant trauma unit.

At the consultation, Dawit reveals a history of trauma – severe experiences at the start of a civil war in his home country, time spent in refugee camps and a move to Seattle in 1994. He has already tried various treatments for PTSD, including several families of medications, but they were not effective. The hospital is running a study that tests deep brain stimulation for treatment-resistant PTSD. The DBS research team stresses that his memories will not be erased, but their impact may be “softened”.

His wife encourages him to enroll. His son, Ilyas, however does not support the DBS study. Not only is he is concerned for his father’s well-being, he is also worried that the implant may alter his memories of the traumatic events, as his memories are an important part of his life narrative. Ilyas works as an activist, and has often brought his father along to meetings to share his story. His son is worried that Dawit’s ability to communicate the devastation wrought by the civil war and its aftermath will be lost if his memories of the events are “softened”. As with their relatives in Ethiopia, Ilyas also fears that his father may lose the power of his memories to fight for change, even as his mental health improves.

With his family split in this decision, Dawit takes a three-day break from work to consider his options.

Questions:

- *Should Dawit undergo DBS treatment? Why or why not?*
- *Is there a difference between erasing a memory and taking away the “sting” of a memory? Do Dawit’s memories give him the ability to motivate others the way Ilyas claims they do?*
- *Should we be able to adjust our memories using technology? Are there other ways to adjust our memories, and are these any more (or less) problematic?*



Case 5: Imaging or imagining the future

written by Sami Ayele and CSNE Ethics Thrust

Advances in neurotechnology provide governments with new methods of selecting employees. Imagine the following hypothetical case. A certain government spy agency has found that adding fMRI to its interview process is an efficient and effective way to screen individuals for high level security clearance. All candidates are informed that fMRI will be part of their interview. Several potential candidates for an array of positions at the agency have concerns regarding this level of inspection – including Tara - but proceed with the testing as this is the only way to her dream job. The agency has developed an fMRI algorithm to determine each individual’s “brain fingerprint” for true and for false answers. Tara “passes” the exam and is offered her sought after job as a field agent trainee.

Unbeknownst to Tara, the agency is working on enhanced algorithms based on the “brain fingerprint” obtained from its fMRI screening. The agency hopes to be able to use data from the original screening test to “guide” the careers of its employees (e.g., leadership potential, ability to handle high stress situations, likelihood of challenging authority, and so on). Tara finishes her field training but finds that when she applies to many of the positions within the agency she is told that she is “not a good fit for these” based on the output of the brain fingerprint algorithms. She is frustrated and feels like her “brain is being used against her.”

Questions:

- *Do we have a right to keep our signals private?*
- *What are the concerns over knowing behavioral correlations in the brain?*



Case 6: It wasn't me!

written by Matthew Sample and CSNE Ethics Thrust

Fiona was involved in a car accident that resulted in a complete lower spinal cord injury: she has lost control of both of her legs. She has agreed to participate in a clinical trial of a device that links implants in her brain to the nerves in her legs, allowing information from her brain to bypass her spinal cord injury and control her limbs directly. Instead of *just moving* her legs as she wishes, her legs are controlled by thinking in different ways (like trying to have the thought “now I will move my right leg forward”).

The brain activity she generates is picked up by the implants in her brain, interpreted by a computer, and sent down to move her legs. Getting the device to work well requires Fiona to endure long training sessions (2-4 hours, almost daily) for months. Over time, she begins to have success with the device, though her walking isn't as easy or fluid as it once was.

After a year of using the device, Fiona opts to upgrade. A new operating system for the device is available, one that is able to predict when and how she wants to move her legs. This is useful because sometimes Fiona gets tired or distracted and generates brain activity that isn't easily or accurately translated into smooth motion of her legs. The new operating system will be “smarter” – it will extrapolate what she intends to do – like a text messaging or internet search site “autocompleting” terms or phrases.

Fiona hopes that her limbs would be more responsive (that she would be able to control them with less attention) after the upgrade, and so she spends relatively little time training with the new software. But shortly after the upgrade, Fiona has an accident. Her left leg responds too slowly and it causes her to stumble into a shop display. She claims that the new software is not as reliable as the previous version, and blames the software's designer for the fall.

Questions:

- *Is Fiona right to blame the new adaptive software and/or its designer?*
- *How could we tell who is responsible? What evidence could help us decide?*
- *Would it make a difference if her accident occurred before the upgrade? Why?*
- *Can she be responsible for an accident even if she didn't plan or mean to do it?*