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Dear Readers,

Welcome to the special INS (International Neuroethics Society) issue of the IYNA Journal! We greatly appreciate your readership, continued or new. This issue serves as the second installment in the third season of the IYNA Journal, and we have worked hard at producing more high-quality articles for everyone to read and encouraging a growing number of high school students from around the world to submit their neuroethical analyses to the journal. All of the articles in this issue were submitted to the INS neuroethics essay contest, and we’ve hand-picked a special few to showcase in this month’s journal.

We have been receiving many wonderful articles from you guys. It is clear how much the journal is improving as we progress into the new year. We would just like to thank everyone who has submitted articles to this issue and prior issues alike. Without your dedication and hardwork, we would not be able to spread the word about the amazing diversity in subject matter that neuroscience, and neuroethics specifically, has to offer. With that being said, here are some previews of the essays published this month:

Kyle Sugita discusses the effects of “smart drugs,” Kalie Uberti and Athena Yao delve into brain-computer interfaces, Dyanne Ahn explores the ethical implications of altering memories, Lasya Kambhampati analyzes the neurological implications of the trauma faced by displaced refugee populations, Aybala Turkarslan sheds light on the ethics behind tapping into consumers’ brains to predict their decisions, Jaeah Kim examines the risk that electronic cigarette usage poses on adolescents, Milena Malcharek explores the novel use of neuroimaging to assess non-communicating patients, Mustakim Muhurto Rahman sparks a dialogue about the ramifications of utilizing memory-dampening technology to treat PTSD patients, Nannarelle Hundertmark inquires about the relationship between neuroscientific implementations and one’s sense of self, Sonia Seth ponders how to treat unconscious patients when end-of-life preferences are not declared, and Lauren Kayari evaluates the psychiatric implications of being the accuser versus the accused in a case of sexual assault or harassment in the #MeToo era.

We would like to recognize all of our dedicated editors for helping us make this issue the success that it is. You can see all of their names and positions on our Contributors page. If you have any questions, comments, or suggestions for us, please feel free to contact us at info@youthneuro.org. We hope you enjoy reading this issue as much as we enjoyed editing it!

Best Regards,

Sojas Wagle - IYNA Journal Editor-In-Chief
Anita Singh - Managing Editor
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Armstrong? More like Brainstrong: Cognition Enhancing Drugs in Academia

Kyle Sugita

Abstract
As far back as written history can recall, drugs have been used to alter the human body. From increasing muscle size to numbing pain, stimulating the senses to shutting down parts (or all) of the body, medicinal and recreational drugs have been tailored by manufacturers to meet the ever-growing needs and desires of society. In recent decades, the ever-central importance of education and occupational success has attracted both users and producers to a lesser-explored area of drug use: cognition enhancement (CE).

Adolescents, who at one time had to transgress social and familial injunctions to obtain these neuroenhancers, are now given ADHD-prescribed Adderall by their parents in preparation for tests [1]. College students down similar pharmaceuticals, for example methylphenidate and modafinil, to push through studies and exams, in a trend now termed “academic doping” [4]. Remembering Lance Armstrong’s fall from grace in the light of his steroid-induced physical enhancement, neuroscientists are leery about the moral and ethical implications of the developing “smart drugs” which, if left unregulated in availability, could also have irreversibly detrimental consequences in both performance disparities and physical health [11]. This paper explores the rise of CE drugs, the field’s ongoing research, and the future of these neurological enhancers, all in the face of the question: is the accessibility of CE drugs to healthy college students ethical?

Rise of the “Smart Drug”

Substance use to enhance cognitive function is far from new. For at least one-thousand years, the psychostimulant caffeine has been relied upon as a brain stimulant [3] and, along with other “brain-boosting” drugs, now falls under a more recently defined category of enhancers: nootropics [7]. Identified in the 1920s, nootropics were initially simple drugs capable of inducing slight improvement in basic brain function, but in the past century, they have evolved to include such powerful substances as amphetamine and nicotine, and are now collectively referred to as “cognitive enhancers” [6]. How are these stronger, more physically altering drugs available to and used by students is the subject of this neuroethical debate.
Looking at the fundamentals of CE, cognitive enhancers were formulated to support the unhealthy public. Amphetamines were used as stimulants for the depressed and narcoleptic [2] and nicotine, with its stimulant and depressant effects, was a versatile drug used for various medicinal purposes [9]. In modern application, drugs are used to address symptoms, sometimes even “curing” the patient in the case of antibiotics against infections [8]. However, the purpose is always to bring an individual back to or near homeostasis. Certain neurodegenerative diseases, such as schizophrenia, have been researched extensively and now make use of antipsychotic medication to balance out the cognitive deficits associated with certain conditions [5]. Questions arise when patients, such as students look for an extra push during midterms, with no signs or symptoms of a neurodegenerative disease or similar affliction request access to this medication with the purpose of enhancing an already stable body beyond normal function. Is this fair? Will the enhancers work as intended? Is forcing one's body beyond its natural limits safe?

The answers to these questions are hardly even in development, as clinical trials about the efficacy of drugs are conducted in a setting where the patients have an actual diagnosis (not on healthy individuals) [6]. The “possible side effects” expressed when a medication is prescribed are derived from historical reports on ailing users, but special risks would only be known once physicians start prescribing CE drugs to healthy users and begin taking reports [7]. Here, users are subjecting themselves to swimming in unexplored, potentially life-threatening waters. From a purely neuroethical standpoint, the fact that there is minimal research regarding the effects of enhancers because such investigation would call for applying “treatment” to “healthy” individuals is reflective of one guiding question: how can it be justified to allocate limited time and resources to strengthening the healthy when the suffering continue to fight for a cure?

Research on Current and Developing Enhancers

Presently, scattered research projects are underway that split from the clinical trials of standard medicine and explore the effects of cognitive enhancers on individuals with more average cognition than ailing patients. One recent investigation examined the effect of medication usually used to treat dementia in subjects with “mild cognitive impairment”. After analyzing eight clinical trials and reporting absolutely no effect other than an increased risk of gastrointestinal complications, the study concluded simply that the “findings do not support the use of cognitive enhancers for mild cognitive impairment” [10]. Initiatives across the world have conducted similar trials, testing varying degrees of patient cognitive ability with differing medication, and while drugs like modafinil have been proven to improve cognition [5], the reliability of CEs has yet to be explored in-depth and remains inconclusive.

Implications for the Future of CE

Just as with anabolic steroids, the appeal of CE drugs is understandable. After all, who doesn’t want to be ahead of the curve, especially if all it takes is a pill? But from time and time, it has been shown that no augmentation comes without consequences, yet users still choose to gamble with the repercussions of bodily enhancers. One writer exemplified this understanding in his study
of world-class athletes, in which he discovered that more than half of athletes would take a pill that would guarantee five years of undefeated, athletic success at the cost of their life [7]. Likewise, students who use CEs are at risk of overdose and there are other complications in the hope that the drugs will positively affect their academic performance.

There is not enough research to substantiate the safe and effective use of cognitive enhancers in any environment, including the academic setting, in which students are under constant pressure to outperform their peers. Researchers are overburdened with conditions that have yet to find a cure, and focus is directed towards developing improvements to current medication which alleviates the suffering of these patients. To allocate the already scarce time and resources of researchers to strengthen the healthy is to take away from the precious hours of terminally-ill patients who might see another year if the healthy would just be happy with the time that they have.

References
Introduction

The term brain-computer interface is often associated with thoughts of a science-fiction world filled with cyborgs and aliens, but, as far off in the future as it may seem, many companies and universities today are working to make that vision a reality today. Brain-computer interfaces (BCIs) are machines that convert neural impulses to real-world outputs. These machines could make a huge difference in the lives of amputees, people born with limb differences, and people who are paralyzed [2]. Those are the intended clients for most BCIs, but it would be imprudent to assume the development of such a device would stop there. The companies envisioning these devices say they will be able to “connect minds”, allowing a type of brain-to-brain communication. They say one will be able to access the internet in their brain [3]. While each of these benefits has its own ethical implications, the most concerning one comes from the societal impacts of brain-computer interfaces as a technology allowing unprecedented mental augmentation: the exacerbation of the wealth gap between rich and poor.

Figure 1. Diagram showing how signals (inputs) from the brain in a BCI can be processed and translated into movements in an external device (outputs) [1].
Beginning in the 1970s, skill bias (favoring of skilled over unskilled labor) by companies and organizations accelerated resulting in a sharp increase in within-group inequality [4]. Technology replaced many working-class jobs causing people to have to switch their field as their former field became automated [5]. Due to increased competition for highly skilled workers, the pay gap between those with college degrees and those without, has been widening [5]. Today, on average, American workers with a bachelor’s degree earn $1 million more over their lifetimes than those who only have a high school diploma [5].

This is eerily similar to what happened during the Industrial Revolution in Britain in 1800. During that time, there were many non-agricultural workers with well-paying jobs, such as handloom weavers [6]. While the industrialization of spinning first increased the demand for these workers, the arrival of powered equipment and machinery later had dire consequences on the lives of the workers. If they stayed in the same field their earnings fell over the next few decades by as much as 90% [6].

Modern Applications

This can be applied to the rise of brain-computer interfaces in a multitude of ways. First, the voluntary adoption of brain-computer interfaces may force the adoption on others. To take the historical example, the spinning machines from the 19th century were invented because they were profitable [4]. People would be more effective, and thus more profitable, if they are able to have more information by having a direct connection with the internet via their brain. They would be able to communicate more effectively by using the brain-to-brain communication. This would either force people who are hesitant to adopt the technology to do so or be left in the dust as more companies seek to hire people who will earn them the most profit.

While some may have the choice, others may not be so lucky. While some experts will argue that price drops as technology ages, the initial price of any new technology is exorbitant. The noninvasive brain computer interfaces of today, even with their limited capabilities, cost around $5,000-$10,000 [2]. This means that when such a device is marketed to the average consumer, the people who can afford to can adopt it quickly to stay ahead which would allow them to continue to buy the latest versions of BCI technology. Even if, one day, the technology becomes cheap enough for impoverished families to afford, the rich will have already moved on to even more expensive, updated versions of the technology. According to Jerry Kaplan, a PhD in computer science, “The benefits of automation naturally accrue to those who can invest in the new systems,” [7]. What’s more, due to the exponential progress of technology, this will lead to an even greater exacerbation in the wealth gap than has ever been seen before [8].

Even with today’s technologies, inequality within advanced and emerging markets has increased. Former United States president Barack Obama called the widening income inequality the “defining challenge of our time” [9]. Some inequality is not necessarily problematic, as it allows people to compete and move ahead in life. Despite this, widening income inequality is a major issue, for more reasons than quality of life. It can have significant implications for macroeconomic stability, concentration of political power, political stability, and investment potential[9].
Conclusion

The introduction of a technology allowing for this amount of instantaneous mental improvement is beyond anything the world has seen before. While it will open up dream-like opportunities for some, those who cannot afford it will be left off even worse than they were before. As has been shown by historical examples, this could cause the wages of workers who do not or cannot seek out such improvements to fall dramatically [6]. Already, with today’s technologies, the wage gap has widened between the rich and poor and may increase exponentially with the progress of technology [5][8]. Though brain-computer interfaces will substantially improve the lives of their initial audience, much thought must go into the ethical implications before developing a brain-computer interface for the general consumer so as to circumvent the worsening of the wage gap.

References


Brain-Computer Interfaces: Futuristic Prospects and Ethical Dilemmas

Athena Yao

Abstract
As technology continues to advance at an unprecedented rate in our society today, we now have access to a multitude of new possibilities. One of these prospects is the development of brain-computer interfaces (BCIs), technology that enables direct communication between a machine and signals from the brain, thus enabling us to control our surroundings with a mere thought or communicate with others without having to say a word. At the same time, there are also many ethical implications to consider as we look into the future of humankind.

Introduction
What would it be like to be immersed in a virtual world, to be able to control your surroundings with merely a thought? How would it feel to operate a prosthetic limb, wheelchair, or cursor using just the signals from your brain? Would you be intrigued by the possibility of being able to communicate telepathically, or to enhance your cognitive abilities so that you’re even smarter than a computer?

If these concepts fascinate you, you’re not alone. Throughout the past few decades, there has been a growing interest in the interaction between our brains and machines. It has permeated our lives, from the books, films, and TV shows we enjoy to the advanced technology that may be available to us not very far into the future. For example, in Star Wars Episode V: The Empire Strikes Back, Luke Skywalker is fitted with a prosthetic hand that allows him to feel sensation as if he had a real limb [1]. Episode 2 of season 4 in the television series Black Mirror introduced a revolutionary child monitoring system called Arkangel, in which participants are given a neural implant that enables parents to monitor their children’s geolocation and medical state while also enabling them to track and censor their child’s vision to keep them from registering obscenity or stressful stimuli [2]. Taking things a step further,
in Marie Lu’s 2017 book Warcross, gamers used NeuroLink, a brain-computer interface accessed via glasses or contact lenses, which implants into users’ brains and allows them to enter the virtual reality game of Warcross. However, the software holds a sinister side: NeuroLink can also manipulate people’s emotions and even their minds, helping to prevent violence and crime but also removing important aspects of free will [3].

Time and time again, the concept of brain-computer interaction and interface technology has proven intriguing, holding endless possibilities that advance ever-closer to becoming a reality. Put simply, brain-computer interface (BCI) is a set of technologies that enables direct communication between the signals from a person’s brain and a machine [4]. A BCI typically consists of sensors or ‘electrodes,’ which measure faint brain signals with the help of an amplifier, along with a computer to translate them into commands [5]. Brain-computer interfaces have various applications that allow us to enhance both ourselves and our perceptions of the world: from use in gaming and communication to memory enhancement and prosthetics [7]. As advancements continue to be made, it is necessary to consider the implications for ethics, neuroscience and our society at large.

**Ethical and Social Implications**

Consider the concept of virtual reality. The thought of being able to retreat into a fantastical world that bends to your mind’s will is thrilling. But what if the roles were switched, and the interface that read your thoughts in order to carry out your wishes advanced to be able to read your thoughts and alter your wishes? In another vein, perhaps we would lose a piece of control over our thoughts and actions. We have all thought about saying or doing something, yet refrained from actually acting. If a BCI device reads a thought and executes a harmful action that you would not normally have carried out, would you be completely responsible? Consequently, what would happen to your sense of responsibility, privacy, and autonomy as a person?

Furthermore, take a moment to consider the idea of a BCI child-monitoring system, such as the one introduced in Black Mirror’s episode “Arkangel.” Parents would never have to worry again about their child’s whereabouts or safety, and missing child rates would drop tremendously. But
this kind of brain-computer interface system also raises ethical questions of privacy and information sharing. Should parents be able to track their children’s every move and see through their eyes in the literal sense—and even be able to censor their children’s vision without informed consent? On the other hand, what would happen if private, personal information falls into the wrong hands?

Recent advancements and initiatives bring up additional ethical considerations. In 2016, billionaire Elon Musk co-founded Neuralink, a neurotechnology company that aims to make devices to treat brain disease and damage while also developing technology for human enhancement. The company is currently working on BCI technology that could allow human brains to compete with artificial intelligence through linking them with computers without needing a physical connection [8]. The prospect is riveting, although it also results in ethical dilemmas about personhood and what it means to be human. Since BCIs allow your brain to connect so directly to a machine, should they be considered tools or a part of you? As noted by Burwell, Sample, and Racine, researchers at the Montreal Clinical Research Institute, “the Oxford English Dictionary defines a cyborg as ‘...a person whose [...] capabilities are extended beyond normal human limitations by a machine; an integrated man-machine system [g].’” With this in mind, would a person augmented by BCI technology still be considered human?

Conclusion

The scenarios brought up in this article are just a few examples of the ethical dilemmas that we must consider as our society advances. Brain computer interfaces hold great potential, especially in the future of entertainment and in helping those with severe disabilities. Considering this potential and the ways in which they have already begun to improve lives today, it is clear that the strive for development will not end anytime soon. However, we must also recognize that these benefits are also accompanied by important ethical and societal challenges [10]. Thus, it is important that all stakeholders involved discuss the implications this technology could have for autonomy, privacy, legal and moral responsibility, and various other issues of ethics. This topic doesn’t just require the cooperation of legislators, ethicists, or neuroscientists; rather, it also necessitates the input of the public—and you—in consideration of the future of humankind.

References


Abstract
Electrostimulation and optogenetics are examples of new technologies that researchers have developed to tackle neurodegenerative diseases such as Alzheimer’s and Parkinson’s diseases. However, critics have voiced concerns highlighting the dangers of these technologies being used in clinical applications. This article resolves the misconceptions concerning electrostimulation and optogenetics and suggests the potential benefits of utilizing such technologies.

Introduction
Electrodes (electric conductors) plugged onto your scalp sounds like a scene from Minority Report, where Tom Cruise and his team use psychic technology to arrest and convict murderers before they commit their crimes. It might also ring a bell for all the Matrix fans out there: artificial brains implanted to enhance memory. However, these technologies that seem to be a common theme in movies are becoming a reality.

Electrostimulation and optogenetics are new technologies that researchers have developed to tackle neurodegeneration. Electrostimulation is a noninvasive therapy that reconnects the neural pathway of patients by sending mild stimulation via scalp electrodes [1]. Optogenetics utilizes neurons that are genetically engineered to express opsins, which are light-sensitive proteins [2]. Some ethicists claim these technologies are too dangerous to be used in clinical settings, but electrostimulation and optogenetics for therapeutic applications are ethically acceptable because they do not control minds, pose serious consequences, or risk abuse by patients [3].

Misconception of Electrostimulation and Optogenetics
Many people argue that electrostimulation and optogenetics may be abused upon the brain. Contrary to this belief, current research in electrostimulation and optogenetics focus not on enforcing memory, but rather reestablishing rhythmic pathways in the brain and restoring movement for Alzheimer’s and Parkinson’s diseases.

For example, scientists from Boston University employed the mechanisms of coupling and synchronization of brain rhythms to enhance working memory. Coupling enables people to store
working memories by coordinating different brain rhythms, and synchronization allows people to form one cogent memory by connecting separate brain regions [1]. Enhancing working memory through rhythmic pathways is not equivalent to controlling one’s mind because all the information is already present in the patient’s brain, and no new or false memory is implanted.

![Figure 1. Professor Rob Reinhart and the Neuromodulation System for Electrostimulation [4].](image)

Furthermore, at Carnegie Mellon University, researchers studied how optogenetics can be used to reduce the movement-related symptoms of Parkinson’s disease by activating specific neurons in the basal ganglia [5]. Although the study demonstrated how brain cells could be controlled to produce desired effects, the mind of the mouse model in the experiment was not manipulated with forced behaviors. Instead, the brain cells were utilized for controlled movement ability, which is one of the difficulties faced by patients with Parkinson’s disease. Hence, electrostimulation and optogenetics are ethically acceptable when they are used for therapeutic purposes to help patients recover from the symptoms of these diseases.

**Negligible Side Effect**

While some critics claim that electrostimulation and optogenetics may pose side-effects to the patients, studies have indicated otherwise. Professor Rob Reinhart of Boston University, the lead researcher in the study of electrostimulation, stated “I’ve recorded thousands of participants over the past several years and the most severe adverse effect is a slight tickling or itching sensation under the electrodes [6].”

Moreover, in August 2015, RetroSense Therapeutics received FDA approval for the first human test of optogenetics to treat a patient suffering from blindness due to retinitis pigmentosa and advanced dry age-related macular degeneration. FDA approval itself confirms that optogenetics does not pose significant side-effects to the patients [7]. Also, safety issues have not been a concern in the years that this treatment has been in effect, further supporting the security of optogenetics.
In fact, electrostimulation and optogenetics curtail the problems of existing treatments in Alzheimer’s and Parkinson’s diseases. For example, common drugs for Alzheimer’s disease, such as Donepezil, induce nausea and vomiting and they appear to be palliative rather than disease-curing [8][9]. Furthermore, non-pharmaceutical therapies for Alzheimer’s disease, such as reality orientation therapy, have adverse effects by causing confusion in patients [10]. However, electrostimulation does not pose these consequences and effectively improves the patient’s working memory. Likewise, drugs for Parkinson’s disease, such as Carbidopa-levodopa and dopamine agonists, have side-effects such as lightheadedness and hallucinations [11].

| TABLE. PHARMACEUTICAL TREATMENTS FOR MOTOR SYMPTOMS OF PARKINSON’S DISEASE |
|---------------------------------|---------------------------------|---------------------------------|
| ACTION                          | DRUGS                           | COMMON SIDE EFFECTS             |
| Dopamine precursor with metabolic inhibitor | Levodopa-carbidopa | Nausea, vomiting, orthostatic hypotension, visual difficulty, hallucinations, delusions |
| MAO inhibitors reduce levodopa and dopamine degradation | Rasagline | Tablets, capsules, orally disintegrating tablets |
| COMT inhibitors reduce levodopa and dopamine degradation | Entacapone | Tablets, capsules, orally disintegrating tablets, nausea, vomiting, orthostatic hypotension, hallucinations, delusions, dystonia, dyskinesia |
| Dopamine receptor agonists | Pramipexole | Tablets, oral solution, oral solution extended release, nausea, vomiting, orthostatic hypotension, hallucinations, delusions, peripheral edema |
| Other/Unknown | Amantadine | Tablets, capsules, extended release, dry mouth, dry eyes, confusion, hallucinations, delusions, peripheral edema |

Abbreviations: COMT, catechol-O-methyltransferase; ER, extended release; IR, immediate release; MAO, monoamine oxidase.

Figure II. Side Effects of Pharmaceutical Treatments for Parkinson’s Disease [12].

On the other hand, optogenetics illuminates specific regions of the brain with minuscule lasers and possess spatial specificity of cellular processes that therapeutic drugs lack [13][14]. Thus, electrostimulation and optogenetics should be permitted to be used for therapeutic purposes because they not only have minor potential side-effects, but also minimize the consequences of currently existing treatments.

Reduced Risk of Abuse

Finally, electrostimulation and optogenetics are less likely to be abused than pharmaceutical treatments because they are only accessible to medical professionals. One primary concern of using drugs is that they can be abused by patients or even people who are not diagnosed with the disease. Takao Hensch, a Harvard professor of cellular biology, stated that Donepezil can help return the brain to a “critical period” by increasing the amount of acetylcholine in nerve endings [15]. However, the concern with such drugs is that they can potentially be abused. Notably, “smart drugs” such as
Adderall are consumed by students to improve their memories and concentration for academic success. Although Adderall is prescribed to treat attention deficit hyperactivity disorder (ADHD), students often take advantage of the drug because it can be easily purchased. According to the 2017 Global Drug Survey conducted by the International Journal of Drug Policy, nearly 30 percent of the U.S. respondents claimed they used drugs for pharmacological cognitive enhancement at least once in the preceding 12 months [16].

Additionally, studies have indicated that Levodopa, a common drug for Parkinson’s disease, may be addictive, as seen in the case of two patients with Parkinson’s disease showing Levodopa dependence [17]. Despite the discretion given by their doctors, the patients were unwilling to consent to the recommended dosage to maintain their state of euphoria [18]. However, because electrostimulation and optogenetics must be conducted by medical professionals, they offer therapy that is less likely to be abused.

**Conclusion**

Herman Melville once said, “ignorance is the parent of fear.” The public currently doubts the safety of electrostimulation and optogenetics and notes them as new, and thus potentially risky, methods. New technologies should not always be accepted at face value in society; in fact, their social implications should thoroughly be considered at all times. The ultimate takeaway is this: it is crucial for people to start viewing new technologies, such as electrostimulation and optogenetics, with an open mind, for these very technologies can truly create a valuable impact in the therapeutic advancement of humanity.

**References**


Moving On: A Refugee Crisis

Lasya Kambhampati

Abstract

The number of refugees throughout the world, particularly children, has skyrocketed in the last decade. The trauma they face, both in the home and host country, causes changes in the hippocampus, reward centers, grey matter, and amygdala. The neurology behind these symptoms is complex and not fully understood yet. These changes are linked to significantly higher rates of mental health disorders among refugees, in some cases 30 times higher than the non-displaced population.

Context

As a result of conflict and persecution, 29.4 million people worldwide are refugees or asylum seekers. Over 40% of them are children, a group particularly affected by the trauma in their surroundings. As these statistics increase, countries are struggling to keep up with the influx of migrants and provide them with the support they need. In countries such as the United States, the backlash has caused policies to shift towards keeping migrants out instead of helping them -- at times, even detaining asylum seekers in allegedly inhumane holding centers.

Issue

As the number of refugees has increased, there has been more research conducted on refugee welfare. Scientists used tests, such as the Harvard Trauma Questionnaire, to measure mental health over various time periods. The test results showed that mental health concerns persist if treatment is not received or if detention facilities, chronic family separation, unemployment, or social isolation played a role in the trauma.

Cross-sectional studies have found that nearly 15 - 30% of the refugee population show signs of PTSD and have, on average, two flashbacks per day. In comparison, the rate of PTSD in the general population is around 1.1%. Other disorders, such as depression and schizophrenia, remain prevalent and severe in refugee groups. With the ever-increasing number of migrants, scientists such as epidemiologist James Kirkbride have termed it a “public health epidemic” - one that is invisible but far too dangerous to go unaddressed.

Furthermore, studies report that “prolonged detention, insecure residency status, challenging refugee determination procedures, restricted access to services, and lack of opportunities to work or study, combined in a way that compounded the effects of past traumas in
exacerbating symptoms of PTSD and depression” [9] [10] [11] [12] [13]. Many of the conditions that refugees are subjected to meet these risk factors and show the need for change in our policies.

**Effects**

Scientists have discovered that the hippocampus atrophies, leading to memory and concentration problems, and the amygdala enlarges, increasing anxiety, aggression. The overactive amygdala is usually controlled by the prefrontal cortex; however, trauma causes this pathway to be impaired, leaving the amygdala unchecked [18] [19] [21]. These structural changes help explain the high prevalence of mental health disorders in the migrant populations.

Further evidence lies in the reward system. Neuroscientists have observed changes in brain structures such as the nucleus accumbens and ventral striatum. The HPA axis, which involves the aforementioned structures, regulates responses to temptations and distractions and is damaged as a result of stress, resulting in the brain needing more stimulation to receive a reward or even anhedonia [20]. Moreover, there is a significant decrease in cortical thickness and surface area, as well as dendrite length. Interestingly, these changes can be reversed if the trauma occurs in adulthood, but not in childhood - confirming children are distinctly vulnerable to the debilitating effects outlined above [21].

These effects are known as toxic stress, which is caused by stressful events such as separation from parental figures. Even when people are able to escape from their source of trauma, the toxic stress on their body, specifically the brain, does not dissipate. Without proper attention, it can develop into mental health disorders – explaining the high rates of PTSD, depression, and schizophrenia observed in refugees.

**Solutions**

As dire as the situation seems, researchers have come up with some solutions.

First, they propose that lawmakers move away from the idea of “quick integration.” Clinical psychologist Thomas Elbert says that “It is illusory to think that people can learn a new language and find work when they can’t function properly mentally. If we want quick integration, we need an immediate plan for mental health.” Moreover, it is essential to reduce the stress that migrants face when entering recipient countries because excess toxic stress can only compound the effects on the brain and body. [22]

Scientists, recognizing that many countries do not have the time or money to provide the necessary treatment, have come up with innovative, inexpensive ideas.

One is an app known as MeWe – an interactive storytelling program made in collaboration with UNHCR. The creator’s hypothesis is that an arrested story (in which a person feels as though their narrative is written by others) leads to arrested development and mental health issues. These issues, hypothetically, could be alleviated by MeWe, which allows users to take control over their
story. Research at Princeton University shows that storytelling can change neuronal coupling and brain structure. Although it would not be as potent as therapy or medication, it can alleviate the negative effects of mental health disorders and improve self-efficacy.[23]

Another solution is to train laypeople to guide refugees through the health system and provide basic counseling. Dr. Elbert has conducted research in Afghanistan and Germany showing that systems, where lay people can carry out Narration Exposure Therapy, can alleviate symptoms and free up time for professional psychologists to deal with patients with severe illnesses. This solution has been implemented throughout the world successfully, showing its viability. Not only is it effective, it requires minimal extra resources on the host country, providing benefits for both parties. [22]

Irrespective of the receiving of refugees, research shows those escaping turmoil in their home countries are at heightened risk of mental health disorders and current policies are inadequate in providing the help needed. Furthermore, there are viable solutions available that can change the lives of millions of people.

References


Neuromarketing in Politics: The Ethics of a New Age

Aybala Turkarslan

Introduction

We've all seen those brightly colored posters that deck the sidewalks during election season. A bolded name paints the small square, typically with a quick political slogan at the bottom, and perhaps a small photo of the candidate or party for some allure. Either way, we've all likely come across some form of political advertisement thus far, if not during this very year. But what if someone could analyze our subconscious thinking, the parts of reasoning and decision-making that we, as individuals, have yet to access within ourselves? What if candidates could research brain patterns, heart rate, and other bodily functions to reveal our responses before developing a campaign? That concept is called neuromarketing, a relatively new innovation that accesses a simpler way to predict consumer decisions and reactions to products [1]. But how is this tool being harnessed, and under what circumstances? But most of all, is the application of such marketing invalid, if not unethical in this field? At this very moment, it is clear that political neuromarketing is crossing into unethical waters, as it has broken the privacy of those it involves and has the potential to challenge their autonomy later on—proving that substantial changes in policy must be made in order to fit our ethical standards.

The “Why” Behind Political Neuromarketing

Neuromarketing arises from the ideology that “people cannot fully articulate their preferences, and that consumers' brains contain hidden information about their true preferences” [2]. This scientific field revolves around the idea that this “hidden information” could influence buying behavior, making it so that the cost of such studies is outweighed by the benefit of improved product design and increased

Figure 1. This image depicts applications of functional MRI (fMRI), a tool commonly used in neurotesting, in two different portions of product development [2].
sales [2]. But can this truly reveal the inner desires of consumers, let alone voters? The answer to this question is a stark yes and is proven through research on the topic. For example, neuromarketing studies “have suggested that activation of the medial PFC might be associated with maintaining a subject’s preference for a candidate...whereas activity in the lateral PFC might be associated with changing candidates” [2]. MIT Technology Review also tells us that neurophysiologist Jaime Romano Micha would test subjects for activity in the reticular formation of the brain that tracks engagement, with activity on the left side of the cerebral cortex indicating that they were working hard to understand a political message and activity on the right side revealing when a message’s meaning might have been realized [3]. With this information campaigns are able to refine their message, effectively cutting out portions in which a voter’s attention may wander. When left unregulated, however, such capabilities begin to pose a threat to an integral part of votership: the right to privacy.

Neuromarketing’s Intrusion on Voter Privacy

When it comes to neuromarketing in campaigns, prominent change must be made to protect citizens’ privacy from intrusive marketing tactics. For example, former Mexican president Enrique Peña Nieto’s presidential campaign set up a digital billboard in the lobby of a Mexico City office building during his 2012 run. This advertisement, however, contained a camera which secretly captured facial expressions and “fed them through an algorithm, reading emotional reactions like happiness, surprise, anger, disgust, fear and sadness” [4]. Nieto’s campaign and party also used neuromarketing tools to measure the brain waves, skin arousal, and heart rates of voters during the campaign, even using such technology to pick the most favorable candidates [4]. Such strategies were also applied in Turkey and Poland, with one neuromarketing firm even saying that they worked for Hillary Clinton’s presidential campaign [4]. Thankfully, these strategies were uncovered, but Harvard Business Review clearly states that “...as neurotesting techniques advance and become less invasive, this kind of data could be collected...”
in the field without any awareness by consumers—as was the case in the Mexican incident” [5]. This is a clear concern, as neuromarketing strategies will only become more advanced as new innovations arise.

**Neuromarketing’s Effect on Voter Autonomy**

Neuromarketing also has the potential to affect (and currently affects) the autonomy of voters, as the neural information being uncovered is on its way to being reliably predictive. While conclusive data about neuromarketing’s indisputable effects has yet to come out, autonomy, which is the “capacity to be one’s own person...and not the product of manipulative or distorting external forces” [7], has a substantial probability of being overridden. When it comes to the results of neuromarketing studies, the changes in campaign strategy due to such analysis will likely influence the population’s voting. This would effectively distort a voter’s political decision, as neuromarketing strategies would ideally access information and inclinations that are typically unknown. This autonomy, however, is already being overrun, as the capacity to make an informed decision is overtaken through the discreet use of neuromarketing techniques. Each voter that makes a choice in the presence of neuromarketing tactics is being influenced, therefore negating individual autonomy. This gets especially dangerous when looking back to the excerpt from Harvard Business Review, as neuromarketing data could easily be garnered without any awareness from the consumer as techniques advance.

**Looking Forward**

Election season for the next U.S. President is due to begin in 2020, but campaigning has already begun for many candidates, with the most probable nominees having already raised more than $100 million [8]. This is extremely important in relation to political neuromarketing, as a portion of the money raised by these campaigns could easily go to neuromarketing firms. While neuromarketing itself is not a bad entity, (as its properties can be well-harnessed for neural research and charitable advertisement), political neuromarketing strategies could easily be harnessed by those running for office to influence voters in manners that may impact their privacy and autonomy. This makes new neuromarketing policies of the utmost importance for voters, as the future advancement of such techniques—while remarkable—will also push our knowledge of them further underground. For that reason, political campaigns must be obligated to state their use of neuromarketing. This would be a vital, necessary policy change for the privacy and autonomy of our people—proving that changes must be made during the time in which we still can.

**References**


Nico-teen: The Neuroethics of Adolescent Electronic Cigarette Use

Jaeah Kim

Introduction
The past few years have seen a rise in the use of electronic cigarettes among adolescents. The adolescent brain is especially vulnerable to the nicotine compounds in electronic cigarettes due to its unique chemistry and is not only more easily addicted to nicotine, but also significantly more harmed than post-adolescent brains. Considering this, it is troubling that many leading electronic cigarette brands fail to dissuade teenagers from their product and might even actively target them. While electronic cigarettes must be acknowledged as a valuable alternative to traditional cigarettes for adult users, it is also imperative that measures must be taken to protect adolescents from the risk of addiction and harm.

The Rise of Electronic Cigarettes

In the past year, several high schools across the United States have made the unusual decision to ban flash drives. The problem, of course, was not with the flash drives themselves, but with the device that disguises itself as one - e-cigs - or electronic cigarettes. Electronic nicotine delivery systems come in many forms, but the most popular one is called a Juul- a small, sleek device that resembles a flash drive, but stores nicotine instead of computer files. Unlike traditional cigarettes, which pair nicotine with carcinogenic substances, e-cigarettes vaporize liquid nicotine through a heating element and produce a vapor that is inhaled. According to the manufacturers, e-cigs were intended to provide a less harmful alternative than traditional cigarettes for adult smokers; but in a malicious turn of events, the e-cigs have found a new market and created a new generation of nicotine addicts. In the past couple of years, the U.S. has seen an increase in e-cig use among adolescents; between 2011 and 2018, the percentage of e-cigarette users among high schoolers jumped from 1.5% to 20.8% [2]. With this trend likely to continue, it is important to recognize that e-cig use in adolescents can have
detrimental and life-long effects on brain development. Moreover, we must examine the ethical consequences of neglecting to take measures that would mitigate teen e-cig use.

The Adolescent Brain on Nicotine

Adolescence is a period of transition from childhood to adulthood marked by increased vulnerability to drug abuse due to behavioral changes like increased risk-taking, novelty-seeking, and peer associations. Neurobiologically, adolescence is a period of profound structural reorganization of brain regions necessary for mature cognitive and executive function. During adolescence, the brain matures by reorganizing preexisting grey matter, white matter, and associated neurochemical systems. The teenage brain consolidates learning by pruning away less-utilized synapses (grey matter) while stabilizing and strengthening the remaining connections (white matter) [4]. Thus, grey matter decreases during adolescence in the prefrontal cortex, which is critical for executive function and motivated behaviors. This decrease in executive control and decision-making areas is compounded by corresponding increases in white matter, which results in increased efficiency of impulse transduction, and thus an increase in impulsive behavior. The imbalanced maturation of executive and impulse control systems puts teenagers at particular risk of indulging in risk-taking behavior, experimenting with e-cigarettes, for example. Even in the case of traditional tobacco smokers, 90% of users started before the age of 18 [5]. E-cigarettes are simply a new face of substance abuse, one that teenagers have molded in their own image.

When cigarettes first rose to popularity in the 1930s, there was little awareness about its health risks. This, of course, was followed by the tragic rise in lung cancer rates that lagged behind by approximately a 30-year period. Similarly, because of its novelty, there is very little research that exists on the potential neurological effects of teenage e-cigarette use, which is troubling in itself. The research that does exist indicates that adolescent brains are especially vulnerable to damage from nicotine addiction. The rapidly changing adolescent brain has a higher sensitivity to drugs such as nicotine compared to mature brains, and drug exposure during this time can lead to long-term changes in neural circuitry and behavior [6].
Nicotine works by binding to nicotinic acetylcholine receptors (nAChRs) in the brain. This results in the release of dopamine, a chemical that creates a pleasurable experience and causes the “high” that is associated with nicotine. However, nAChRs are also critical regulators of brain maturation in the teenage brain, and when nicotine disrupts the nAchR system during adolescence, it produces drastic and lasting alterations in neurochemistry and neuronal signaling [8]. Research also shows that nicotine may elicit lifelong detriments in the serotonin system, which can contribute to depression or anxiety disorders down the road [9]. Furthermore, chronic nicotine exposure during adolescence also has long-term consequences on cognitive behavior. Nicotine addiction in adolescents has been shown to result in diminished cognitive function, reduced attention span, and enhanced impulsivity later in adulthood [10]. There is even evidence that teenage nicotine exposure, increasingly occurring as a result of e-cigarette use, may induce
epigenetic changes that sensitize the brain to other drugs and prime it for future substance abuse [11].

Neuroethical Implications

With increasing evidence that disruption of nAChRs during adolescence triggers lasting changes in neuronal signaling, it is clear that teenage use of nicotine-laden e-cigarettes has significant consequences on their cognition and emotional regulation. Thus, we must consider the ethical implications of leaving vulnerable teenagers at risk for nicotine addiction. Although marketed as a safer alternative to smoking, e-cigarettes are often not subject to FDA regulation and can be purchased by minors in many states [12]. Compounded with a wide selection of flavors and popularization through social groups or social media, e-cigarettes have become both accessible and appealing to many young people. It is thus necessary to take quick and decisive action and implement measures to curb teenage use of e-cigarettes. However, this progress has been slowed by the problem of maintaining accessibility to adult users, who may require the product in order to avoid the greater evil of tobacco. Last year, the leading e-cigarette company Juul added a small label to its packaging that reads “The alternative for adult smokers,” but rejected putting a bigger, more aggressive statement out of fear that it would make the product seem “edgy” for adult customers. However, there are measures that can be taken without reducing accessibility for adults- for example, increasing federal regulation on the marketing of e-cigarettes or raising the minimum age for the sale of nicotine products. Teenagers are so much more uniquely vulnerable to nicotine than adults and may suffer its harmful effects for a lifetime. We need to combat the epidemic of teenage nicotine addiction before it culminates in a brand new generation whose addiction will haunt them for years to come.

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Stuck in Modern Limbo: How Can We Help the (Un)Conscious Patients?

Milena Malcharek

Abstract
Numerous disputes surrounding the case of Vincent Lambert have shown us that the treatment of unresponsive patients is still a highly controversial topic. Disorders of consciousness are also yet to be properly understood, which can potentially contribute to a wrong diagnosis – and for the people concerned that may truly be a matter of life and death. However, recent advances in neuroimaging can provide us with a solution to the problem in question by not only allowing more accurate differentiation between related conditions, but also enabling us to communicate with some of the seemingly unconscious patients. Nonetheless, ethical concerns linked to the use of these techniques, including lack of a person’s informed consent, should also be taken into account if neuroimaging becomes a common diagnostic tool in the assessment of non-communicating patients.

The controversial case of Vincent Lambert: does ‘unresponsive’ mean ‘unconscious’?

The recent verdict of the French Supreme Appeals Court seems to have been a final ruling on the case of Vincent Lambert. The fate of this mostly unconscious man, who also suffered from quadriplegia, not only caused a serious disagreement between his family members and made them engage in a year-long legal struggle, but also electrified people all over the world and prompted prominent figures – including Pope Francis and France’s former president François Hollande – to take a stance on it. Although Lambert’s life support was eventually withdrawn on July 2nd, 2019, the controversy surrounding this decision shows that the treatment of unresponsive patients is a debatable issue, and that we have yet to reach a consensus on this delicate matter [1].

Differential diagnosis of disorders of consciousness and other related conditions

Vincent Lambert had initially been assessed as ‘minimally conscious’, but afterwards his diagnosis was changed to ‘permanent vegetative state’ [2]. One could ask, however, about the difference between

Figure 1. Arousal and awareness in different states of consciousness [3].
these two disorders and about their relation to other similar conditions – such as coma, locked-in syndrome, or brain death. Brain death – a complete and irreversible loss of brain function – implies the greatest extent of damage, and its defining features include electrocerebral silence (i.e. “flat” EEG – meaning no electrical activity takes place in the brain) and cessation of breathing (apnea). Contrarily, in locked-in patients, despite their being (almost) entirely paralyzed, cognition remains intact. The remaining three disorders are, unfortunately, slightly more difficult to distinguish. In order to do so, today’s neurologists usually rely on a battery of tests, assessing the person’s arousal (presence of sleep-wake cycles) and awareness (ability to perceive and process information). Both of these components of consciousness are absent in comatose patients, arousal being nevertheless preserved in vegetative (unaware) and minimally conscious (aware occasionally or to a limited extent) ones [3].

Although the bedside assessment, based on the evaluation of an individual’s responses to external stimuli, is still the most widespread diagnostic tool, neuroimaging techniques (such as PET or fMRI) have recently been introduced to refine the quality of care and treatment given to patients with disorders of consciousness. Thanks to this innovation, pioneered by Adrian Owen and Steven Laureys, it has become possible to measure cerebral metabolism and identify the most active brain areas – which has allowed for more accurate differentiation between aforementioned disorders. Moreover, Dr. Owen’s team, relying on a newly established experimental paradigm, not only managed to detect clear signs of consciousness in approximately 20% of seemingly unaware patients, but also made contact with them [4]. Such a feat was possible thanks to the careful use of an fMRI scanner, detecting blood flow changes in the brains of patients who were asked various questions – and who had previously been instructed to imagine playing tennis for ‘yes’ and walking around their home for ‘no’. Consequently, the answers of those tested could be immediately seen on a computer screen, as the mental tasks described result in the activation of, respectively, supplementary motor area or parahippocampal gyrus, posterior parietal cortex, and lateral premotor cortex [5] [6].

![Figure 2. Brain activations for two imagery tasks (motor vs. spatial) [5].](image)

**Ethical aspects of neuroimaging in patients with disorders of consciousness**
The research described seems unequivocally beneficial, potentially improving the patients’
everyday life as well as providing them with a means to communicate with the outside world.
However, there are several ethical concerns linked to it – such as the issue of participants’ informed
consent. Today’s medical sciences usually require that the experimental subjects are fully aware of
the purpose of the study and its associated risks and that they make an autonomous decision on
whether to participate in a trial. This can be waived only in a few cases, one of them being a direct
danger to the patient’s life [7]. Thus, scanning the brains of unresponsive people can be seen as a
violation of the principle discussed, especially given that the very procedure might offer no
straightforward benefits to the subjects themselves. What is more, although fMRI and PET appear
to be relatively ‘safe’, some patients, recovered from vegetative state, recall their extreme distress
following their having been put into the dark, claustrophobic inside of a scanner – distress they
were unable to signal [8]. All that, coupled with the elevated cost of each neuroimaging study,
prompts a reflection that such research should be conducted with caution, to avoid medically
unjustified expenditure, and to assure the respect of patients’ rights.

Scientific discoveries may, however, help us tackle some controversial cases concerning
unresponsive (but not necessarily unconscious) people. Nowadays, it is usually up to a close relative
(or consort) to decide whether life support of such a person should be ended. Nevertheless, when
family members cannot agree on the discontinuation of mechanical ventilation or the withdrawal of
a feeding tube, as in the famous case of Terri Schiavo, the solution can require intervention from
high–ranking state officials. And although it seems that such judicial fights could be prevented if
‘advance directives’ (or ‘living wills’) became more widespread and legally binding, they turn out
not to be the best of options. Studies show that the majority of locked–in patients, appallingly often
misdiagnosed as vegetative, are quite satisfied with their lives and do not wish to die [9] [10]. That is
in sharp contrast to the public perception of their condition, likely to influence the content of the
aforementioned documents. Therefore, too much trust put in an individual’s antecedent judgment
may result in their being legally refused appropriate care and treatment – even against their actual
will. The use of neuroimaging techniques could help the doctors to determine the person’s actual
level of consciousness, and maybe even to ask them whether they want the administration of
life–sustaining therapy to continue. Moreover, the patient might be consulted about the choice of
care facility or the most efficient pain medication.

In conclusion, it appears that despite the disorders of consciousness still being poorly
understood, we begin to unravel their secrets. This gradually contributes to the change of attitude
towards the people affected, as we discover that they may be far more aware than they seem. Thanks
to advances in neuroimaging, they can also finally regain control over their lives. And although the
present–day technologies are far from perfect, their potential benefits eventually outweigh the risks
involved. Most importantly, they seem to be the best way to improve the lives of unconscious
patients – and to pull them out of limbo.

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The Problem with Propranolol: Implications of Memory Dampening Technology

Mustakim Muhurto Rahman

Introduction

Researchers are exploring a novel treatment for post-traumatic stress disorder (PTSD) that has been shown to manipulate traumatic memories. Neuroethicists explore the possible ramifications of the new drug, as concerns about the quality of human life, the criminal justice system, and the military start to become increasingly relevant in light of recent progress on memory-dampening technology.

The Problem

Trauma can be one of the most horrific events in the lives of many. Coping with traumatic experiences can be a lifelong challenge and how people approach these challenges can shape their identity. However, a new line of drugs has begun paving the way for individuals to “forget” traumatic experiences. Recent research on β-adrenoreceptor blockers has shown to alleviate and even erase traumatic memories [1]. Neuroethicists continue to study the possible ramifications of memory dampening and erasure, with the pharmaceutical Propranolol showing the most promise.[2]

How Memory Dampeners Work

The process behind memory dampening drugs is not very complicated. The drugs are simply beta adrenoreceptor blockers. Within the sympathetic nervous system, the part of the brain responsible for the “fight-or-flight” response, nerve cells, have beta receptors. These receptors are stimulated when they bind to neurotransmitters -- in the case of Propranolol, the organic chemical norepinephrine [3]. Yet, drugs like Propranolol block the receptors, so they will not be stimulated. When the nerves in the sympathetic nervous system aren’t stimulated, the body is unable to carry out actions associated with fear, such as rising heartbeats and an impaired sense of reasoning. The fear-based responses are no longer associated with the memory, and so over time it becomes “extinct”.

Scientists call a desensitization to fear “extinction learning,” Extinction learning is how people overcome phobias. Also, it is actively being studied in relation to post-traumatic stress disorder (PTSD). Pharmacological interventions that target the norepinephrine system can augment
fear extinction demonstrated in preclinical models [4]. Propranolol, a β-adrenoceptor blocker, has shown to be extremely promising in this regard, with its effectiveness increasing the sooner the drug is administered [5]. One study suggested that Propranolol’s effectiveness as a fear-reducing agent involves a conjunctive treatment using traditional methods such as behavioral therapy soon after trauma [6]. In cases where PTSD has already developed, researchers have found that chronic treatment with propranolol is needed to combat the long-term symptoms.

Ethical Implications

Often in discussions about memory dampeners, the quality of human life is brought up. After all, human life is a culmination of past experiences, and one might argue that we shouldn’t be able to selectively pick and choose which experiences to keep. Ethicists such as Veljko Dubljević discuss that arguments of cognitive liberty aren’t necessarily morally problematic until negative consequences begin to occur at significant levels. In other words, Propranolol hasn’t been shown to cause any negative effects on a large scale and thus is permissible. Veljko suggests state regulatory mechanisms only after this bright line has been reached [7].

A common misconception lies within potentially problematic use of Propranolol in the Criminal Justice System. Sensational articles have written about potential criminals erasing the memories of witnesses; however, this completely misconstrues how the drug functions. Propranolol is a memory dampener – not erasure – meaning that the raw memory still exists [8]. Literature about the possible memory erasing potential of Propranolol determined the function to be highly unlikely in terms of witness manipulation [9]. Only when memory formation and extinction learning are understood can we explore the daunting potential of memory erasure technology.

Perhaps the greatest implications lie within the military. Any government capable of harnessing the power of memory dampening technology could cause potentially disastrous consequences. Military combatants would seemingly be forced to take Propranolol or a similar memory dampener and, as a result, would enable them to commit or experience horrendous crimes of war without any severe emotional repercussions. This kind of technology would strip soldiers of a moral compass. In fact, the military of the United States has already invested in the memory dampening capabilities of Propranolol [10]. Governments looking to make such “super-soldiers” could effectively erase the psychological consequences of war by simply using this drug. In such a world where PTSD is a treatable disease, the value of a human soldier changes in the eye of the government. Each soldier becomes psychologically disposable, as no emotional consequences of trauma would dilute an individual’s performance during combat. Additionally, the value of battle-hardened soldiers increases for soldiers who no longer remain in a state of shell-shock. In the wrong hands, the consequences of memory dampening technology would be horrendous.

In conclusion, there are clearly psychological repercussions that must be considered in the near future. Whether the cognitive relief caused by desensitization to fear outweighs the potential for exploitation in the hands of the criminal justice system or the military is still up for debate in the neuroethics community. Regardless, the ethical implications of Propranolol and future memory
dampeners become increasingly relevant as researchers gain a better understanding of memory formation and extinction learning.

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The Rising Conflict Between Neuroscience and Who We Are
Nannarelle Hundertmark

Introduction
Neuroethics has become increasingly differential from the study of bioethics throughout the last few decades. This categorical separation of research can be accredited to the accelerated development in neuroscience and neurotechnology, which has consequently resulted in the emergence of ethical issues [1]. Currently, researchers of neuroethics reflect the philosophy of the mind in conjunction with these ethical implications. However, one distinctive aspect of neuroethics which separates it from bioethics even further is the relationship between the brain and self identity in terms of ‘who we are’ [2]. Through the use of modern neuroscience techniques, which are capable of altering our memories, changing our moods and personalities can even affect our sexual desires, leading philosophers to question, ‘What is the self?’, ‘What is it that defines a person?’, and ‘What changes can one undergo whilst still remaining themselves?’ [3]. Throughout this essay, these thought provoking questions will be discussed whilst examining to what extent these neuroscientific implementations affect the meaning and quality of the innermost aspects of our lives.

The Question of Personal Identity

Personal identity itself is a highly ambiguous topic several philosophers have pondered for hundreds of years. What are we? Where did we come from? And what is our purpose? [4]. Identity refers to one’s characteristics and properties which make an individual unique. However, one’s identity may develop over the course of his or her life, making one’s personal identity contingent and changeable [5]. This is because one’s qualities that defines him or her -- including national heritage, physical appearance, life choices and their interactions with others -- may vary and oscillate naturally. This variation in identity is what leads many to wonder if they remain the same person for their whole lives, which as a whole encapsulates the question of persistence. Persistence refers to one’s existence throughout time, both throughout one’s lifetime and beyond death[6]. However, although we may be convinced that we ‘persist’ through our whole life as the same being, how can we know this for sure? As a religious believer, this question is often reiterated to question one’s purpose for existence whilst also querying the persistence of our souls into the afterlife. From the cultural perspective of a Christian, the body and mind are seen as separate entities with the soul symbolising the consciousness of an individual, whereas, the body is the physical shell of this consciousness. Nonetheless, the religious versus scientific debate remains an existing variable when considering one’s persistence and the acquisition of identity.
Mind-Body Dualism

Plato and Descartes discussed mind-body dualism when undergoing their philosophical studies, in collaboration with several influential religions which have proposed the theory that our souls have enabled our persistence as beings [7]. Nowadays, we still utilise the phrase ‘body and soul’, where the soul has become a symbol of timeless essence. It is this symbolism of soul that has steered the view of personal identity in terms of philosophy and religion, for which Descartes particularly aimed to provide a scientific reasoning. By using rational arguments to indicate that the mind and body were distinct parts, he advertised his view that the mind was able to persist without the body [8]. This theory confronting the distinction between body and mind is now known as ‘mind-body dualism’ and still remains an influential theory in our modern society [9]. This is seen particularly through the influence of modern Religion where Cartesian Dualism gave rise to the crippling debates between God and the World, matter and spirit, good and evil [11]. However, nowadays these religious ideals often challenge the developing works in the area of scientific knowledge. Consequently, there has been a rising conflict between the modernised use of neuroscience and the theory of ‘mind-body dualism’ as it prevents our ‘soul’s’ persistence and may cause unnatural variation in our identities.

You are Your Brain

On the other end of the spectrum from ‘body and soul’, there is the saying ‘you are your brain’, providing a whole other meaning to the term ‘personal identity’. This saying refers to the fact that your brain is the proximal cause of what you do and why you do it, whilst also largely dictating your habitual behaviour and long term plans [12]. However, the conflict between the dualism theory and neuroscience mentioned earlier stems from the fact that articulating in what way we actually are our brains is notoriously troublesome. We are not sure of the specific aspects of our brain that make us ourselves, or the aspects that define our identity. The lack of reasoning has elevated the concerns raised by neuroscientific practices as our ability to intervene in brains and their functioning overshadows our actual understanding of our impact[13]. This lack of understanding alongside the manifestation of the mind-body dualism tradition in healthcare has heightened public doubts concerning modern medical practice and its effect on human identity.

Deep Brain Stimulation and its Complications
A significant example of the implications of neuroscience with regards to identity can be seen through the medical procedure of deep brain stimulation often used for treating neurodegenerative disorders such as Parkinson’s Disease. Deep brain stimulation involves the deep implantation and stimulation of electrodes in the brain [14]. This neuromodulation helps restore motor function, reactivating the dopamine neurons in the brain [15]. This procedure enables patients to lead healthy, normal lives, often with few detrimental side effects. Nevertheless, due to the procedure’s invasive nature of brain surgery, patients are confronted with serious cost benefit trade-offs [16]. Although the treatment is effective, scientists have little solid understanding of how the treatment works and how it actually affects the brain’s functioning. This uncertainty has heightened due to unusual side effects such as mood changes, addictive behaviours, and rapid personality changes [17]. As mentioned before, these aspects play relevant roles in defining one’s identity; therefore, this procedure revolves around ethical implications of personal identity as it fundamentally changes who the person is. This is a pertinent example of applied neurotechnology having a direct impact on one’s identity, intervening in his or her mind and ‘soul’ persistence.

**Conclusion**

Overall, it is appropriate to assume that everyone wants to endure in some way, be it during his or her life as a being or beyond death in the form of his or her soul. However, existence through the persistence of a soul is prevented through the alteration of our identity due to invasive neurological procedures such as DBS. Therefore, to answer the question *what is the self*, through this it can be proposed that the self is something that is highly adaptable as it largely relies on events throughout one’s life. Using this, there may not even be one version of ‘self’; neurological intervention may just accelerate the change of one’s identity but not solely cause it. It may halt one version of soul persistence, but may give rise to another version of personal identity.

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Treating Unconscious Patients When End-of-Life Preferences Are Not Declared

Sonia Seth

Introduction

It is only fair that all patients have their end-of-life preferences met. However, this idea becomes complex when the patient has not expressed end-of-life preferences prior to an injury and is in a state where communication is not possible. Patients in a comatose, vegetative, or minimally conscious state are often in such situations. In such cases, a lawful surrogate is required to make a decision that best reflects what the patient would have desired. However, there isn’t always an appointed health care proxy. In these cases, familial disputes often lead to the court’s involvement, thereby publicizing such cases and inspiring many social, political, and religious groups to express their respective opinions. Therefore, this has become a controversial topic in the realm of neuroethics. Terri Schiavo and Munira Abdulla are among the names of severely brain-damaged patients whose stories have raised questions about the ethical implications of treatment and end-of-life issues in patients diagnosed with disorders of consciousness.

Case Study One: Terri Schiavo

Terri Schiavo was a woman who remained in a vegetative state for fifteen years [4]. The vegetative state, also known as the unresponsive wakefulness syndrome, describes the state in which a patient is unable to communicate or show signs of behavioral consciousness, but displays preserved autonomic functions, such as respiration and digestion [1]. Schiavo collapsed in 1990 due to an unknown cause and suffered brain damage after oxygen depletion, resulting in a persistent vegetative state [4]. She remained in this state until (after many court cases) her feeding tube was removed in 2005 at the age of 41 [8]. Religious individuals called this a murder, while those who advocated for the “right to die” said Terri should not have been tortured in such a state, and were
enraged at the idea that Congress was interfering with private matters [8]. Schiavo’s husband argued that she would not want to be kept alive by means of a machine and wanted to detach the feeding tube that provided her nourishment [4]. Schiavo’s parents disagreed: she would want it this way, they claimed [4]. Courts went back and forth, but ultimately ruled in favor of Mr. Schiavo and the feeding tube was removed. This decision inevitably resulted in a stir of emotions from the general public, given that the case was so public [8]. Should Terri’s feeding tube have been removed? There were no official papers that documented her end-of-life preferences and Terri had not executed a Health Care Proxy [6]. Therefore, we don’t really know what she would have wanted [6]. The court ruled on the claims of her husband, who, as some sources point out, may not have held Terri’s best interest in mind [4]. Perhaps Terri’s feeding tube should not have been removed. Terri did not seem to be in pain or distress and had her parents by her side, fully willing to take care of her to the best of their ability. Additionally, Terri’s family had released video clips that show her interacting with her mother, hinting to underlying consciousness. Because we don’t know what Terri really wanted, she should have been given exceptional care until her “natural death” rather than try to guess at what she would have wanted.

Case Study Two: Munira Abdulla

In 1991, Munira Abdulla was left in a state of minimal consciousness after a serious road accident at the age of 32 [5]. Abdulla was sitting in the back of the vehicle with her son, whom she cradled for protection just before the impact, leaving her with severe brain damage, and her son with bruised skin [7]. Patients in a minimally conscious state are not able to communicate their thoughts or emotions, but they show minor signs of awareness, such as “visual pursuit, orientation to pain, or nonsystematic command-following [1].” Abdulla was transferred to a London hospital where she was kept alive: she was given a feeding tube and received physiotherapy to prevent muscle weakness [7]. In June of 2018, Abdulla woke up after twenty-seven years [5]. She woke up calling her son’s name, a beautiful moment for Abdulla, her family, her caretakers, and the rest of the world [7]. Her son said, “The reason I shared her story is to tell people not to lose hope on their loved ones; don’t consider them dead when they are in such a state [7].” Had Abdulla’s feeding tube been removed, Abdulla and her son would have never lived to experience that moment. Abdulla’s son left an important message for those who know of someone in a state of minimal consciousness: don’t lose hope. For twenty-seven years, Abdulla’s son did not lose hope.

Conclusion: Case Study One and Two
The juxtaposition of the two cases presented above instills a sense of doubt regarding the outcome of Terri Schiavo’s case. With the recent advancements in technology, researchers are increasingly considering the idea that patients with such disorders of consciousness may have an underlying consciousness that is not visible from an outsider’s perspective. In 2014, a team in Belgium suggested that an unseen level of consciousness may exist in some vegetative patients [4]. The study used neuroimaging techniques to find traces of consciousness in 13/41 (32%) of patients, thereby supporting the argument that there is potential recovery for these patients [3]. Because there is some chance that patients in these states may be revived, the ethical implications of removing nourishment by means of a feeding tube, or other medical instrument, are disastrous (in patients whose end-of-life preferences are not explicitly documented). Some argue that keeping patients with disorders of consciousness in their current state, where they are unable to communicate or show signs of behavioral consciousness, is a sin in itself [4]. Although it is difficult to see patients in this state, there is a clear ethical implication of killing the patient by removing a feeding tube or other mechanism by which they are kept alive. David Crippen, an associate professor at the University of Pittsburgh Medical Center, states, “The price paid for this policy is some indolent shells of humanity that may be maintained in a hopeless condition, but it also avoids the pitfalls of individuals assassinating innocents capriciously. It is the lesser of two evils [3].” The ethics of killing the patient must be accounted for, especially in cases where the patients end-of-life preferences have not been documented. Additionally, health care professionals must not rely on the opinion of those who have not been appointed as a Health Care Proxy. It is difficult to recognize who has the patient’s best interest in mind and who does not, even taking into account friends and family members. If no Health Care Proxy has been appointed, it is best to abide by the ‘lesser of two evils’ and let the patient live.

Figure I. Terri Schiavo and Munira Abdulla’s cases pose difficult ethical questions for neuroscientists to answer [7].
References


Who Do We Believe?: The Neuroethics Surrounding the #MeToo Movement

Lauren Kayari

Introduction

Since the start of the #MeToo movement in 2017, a number of women have accused high-profile men of sexual assault or misconduct. Although many have praised the movement for its empowerment of women, some claim that the accusations can tarnish the reputation of the accused without ample evidence [1]. Research has found that the effects of sexual harassment have lasting negative impacts on the victim’s mental health, including increased risks of depression and post-traumatic stress disorder [2]. Those who are falsely accused may suffer from feelings of paranoia, anxiety, and suicidal thoughts [8]. It is important to recognize the important consequences of choosing the side of the accused or the accuser.

The #MeToo Movement

In 2006, before the advent of the hashtag, activist Tarana Brooke founded the Me Too movement to recognize and connect victims of sexual harassment [1]. Over a decade later, actress Alyssa Milano’s viral tweet invited women to publicly say #MeToo and share their stories of abuse, generating thousands of deeply personal replies from victims. The term now acts as the rallying cry of a movement empowering previously silenced victims to speak out against their assaulters. With this resurgence came a spike in the number of sexual assault allegations, particularly against high-profile, powerful individuals. Most notably, in a groundbreaking report published by The New York Times in late 2017, dozens of women accused Harvey Weinstein of sexual abuse [1]. However, the backlash against the #MeToo movement has arguably been just as strong as the movement itself. As critics point out, with each accuser that steps forward, there is another demonized individual whose life is torn to shreds. Critics also claim that automatically assuming that a victim is telling the truth without corroborating evidence violates the basic principle that we must be
presumed innocent until proven guilty. With these conflicting viewpoints in mind, what are we to make of situations in which an absence of strong evidence renders it impossible to confirm a victim’s claims?

The Effects on the Victim

Research has shown that both physical and verbal sexual harassment have lasting effects on victims’ mental health [2, 3, 4]. In addition to injuries, physical violence can also lead to “sexual dysfunction; mental disorders [such as] depression, [and] post-traumatic stress disorder; and medical symptoms [such as] chronic headache [and] infections [3].” Victims who do not identify as cisgender or heterosexual exhibit even higher levels of these symptoms [3]. Even verbal harassment can lead to psychological damage. One study found that the experience of various forms of non-physical sexual harassment, such as receiving crude comments or being the victim of a sexual rumor, was moderately associated with depression, anxiety, and lower self-esteem [4].

For many victims, psychological harm does not arise as only a direct result of sexual harassment. If victims face negative reactions after revealing the stories of their harassment, another set of trauma symptoms may appear. In a series of interviews with 102 survivors of rape, every victim recalled being blamed for his/her experiences and facing questioning as to whether he/she was exaggerating his/her story or making it up [5]. Such negative reactions often reinforced his/her previous doubts about whether his/her assaults could be considered rape [5]. Others reported increased feelings of self-blame and shame [5]. Using only this lens, when we evaluate the question of whether we should believe the accuser, it appears that doing so would be our ethical obligation.

The Effects on the Accused

However, opponents of the #MeToo movement point out that not all individuals who come forward are truthful in their accusations, though research on this subject is inconclusive. Although some studies have found that only 4% of all sexual assault allegations are false, others have estimated that this number is as high as 41% [6, 7]. Regardless of the true percentage, we must acknowledge that at least some individuals accused of sexual assault are falsely accused. It is also important to note that not all forms of false accusation constitute lies. Sometimes, a victim misidentifies his or her assaulter. Other times, he or she later reinterprets non-criminal actions as criminal. Putting aside the nature of the false accusation, the effects are, more often than not, damaging for the individual who is supposedly at fault.

Apart from facing job loss and the financial burdens of legal aid, those falsely accused of sexual assault also report various forms of psychological harm. In a study of individuals accused of sexual abuse and later exonerated, roughly two-thirds of the participants reported feelings of paranoia and anxiety, and one-third reported self-blame and suicidal thoughts [8]. Almost every participant also spoke about feelings of worthlessness after community gossip and media coverage tarnished his/her reputation [8]. One participant, David, stated that due to the negative media publicity, he did not want to socialize with his family or friends and tended to stay indoors [8].
Although we cannot equate being a victim of sexual assault with being a victim of a sexual assault accusation, we should still recognize the experiences of David and countless others like him.

Who Do We Believe?

The question still remains: in the midst of the #MeToo movement, who should we believe? In an ideal world, we would have a sufficient amount of evidence to see through any lies or misconceptions and act accordingly. However, in many instances of rape or other forms of sexual harassment, evidence is scarce, and there are no corroborating witnesses. In these cases, the only evidence that we possess is the word of one individual against that of another. To respond in a way that is ethically sound, the public should consider the research associating victims of both sexual harassment and false allegations with psychological harm. Before dismissing a victim’s accusation or vilifying a supposed assaulter, we ought to be wary of the devastating consequences if our conclusions are incorrect. Perhaps compassion and understanding are just as important as choosing a side.

References


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