OSMOSIS

The Benefits of Reading on Longevity

Also in this Issue:
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Art and AI
Dear Reader,

Thank you for opening this very special issue of Osmosis Magazine! Made in the midst of the COVID-19 pandemic, the 9th issue of UR’s premier science and healthcare magazine would not have been possible without the dedication of the whole Osmosis Team. I hope these articles answer some questions you’ve always had about the world, while prompting new and exciting interests. If you like what you read, do us a favor and share this magazine with your friends and family. In times when scientific news seems to always relate to sickness and death, we can all benefit from learning about more fun and intriguing developments in science and healthcare.

Your Editor-in-Chief,
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What if I told you there is a scientifically proven way of adding time to your life that is as simple as reading a few chapters of your favorite book? A study performed at Yale University School of Public Health compared the longevity of people who read books to those who only read periodicals. Those conducting the study predicted that the book-readers would have increased levels of survival, as reading books has been shown to promote two distinct cognitive properties tied to longevity.

The study used data from the Health and Retirement Study that followed 3,635 participants over the age of 50 who answered identical questionnaires via phone calls from 1992 to 2012. They assessed the participants’ cognitive engagement by testing them on factors including immediate recall, delayed recall, counting backwards, naming dates and naming Presidents. These items display recall and mental status, both of which reading is thought to strengthen. During the follow up process, 33% of non-book readers died compared to 27% of book readers.

With a linear-regression model, they calculated the association between book reading and cognitive score. To calculate the association between cognitive score and mortality, they used a logistic model. They used a logistic regression to calculate the total association effect of book reading on mortality, which determines whether or not book reading is a statistically significant factor in mortality.

Books engage people’s minds more in comparison to newspapers and other forms of reading in a process known as “deep reading.” Deep reading prompts the reader to make connections from the written material to the outside world and ask questions about the content. A high level of textual engagement improves vocabulary and critical thinking skills, both of which are tied to improved survival. The second cognitive process that reading improves is humans’ empathy and emotional intelligence. This finding speaks to Leo Tolstoy’s view of how reading can change human thought and behavior by empathizing with the struggles and lives of fictional characters. A greater level of empathy and emotional intelligence are also linked to greater survival.

Not only does reading improve cognitive functions like vocabulary, critical thinking, empathy and emotional intelligence, but through these strengthened cognitive functions, book readers were shown to have a 23-month survival advantage compared to non-book readers. When comparing book readers to those who read exclusively newspapers or magazines, the book readers had a 20% reduction in mortality. These survival advantages were seen in participants regardless of sex, race, income, health status, and level of education. Reading, no matter the person, was found to be a tool to improve cognitive functioning and subsequently improve longevity!

But how much does one need to read in order to reap the benefits of a good book? The study proposes that by reading a book for only 30 minutes a day (around a chapter or so), one can add significant time to their life. Reading is an imaginative way to lead a healthier life and far more enjoyable than alternative health remedies. So in between readings for class or whenever you have free time, consider reading a book to bring creativity into your day while adding priceless time to life.

References


The Benefits of Reading on Longevity
Olivia Lomax
Siri, Waze, Google Translate, Instagram -- we experience Artificial Narrow Intelligence (ANI) every day of our lives when we use apps that are trained for a specific task, such as when Spotify recommends new songs based on the music you already like. These apps compute the data users give (whether knowingly or not) and adjust their own algorithms to provide the best possible experience. This is an application of Artificial Intelligence called machine learning. While some see it as a subset of AI, many argue that the ability to learn and improve through experience is critical to the very definition of intelligence. The explanation of machine learning is all-encompassing: "the programming of computers to optimize a performance criterion using example data or past experience." This may mean showing online shoppers clothing ads based on their previous purchases, or, in this article, it may mean breaking our perception of what makes an artist and what makes art.

In an article titled "AI is Blurring the Definition of Artist," Ahmed Elgammal breaks down the process of teaching AI to autonomously create art. Artists first choose and feed thousands of images in the same genre or time period to teach an algorithm a specific aesthetic: for example, Impressionist portraits. Next, a class of two-sided algorithms called general adversarial networks (GAN) are used. "One generates random images; the other has been taught, via the input, how to judge these images and deem which best align with the input." Then, artists must sift through the produced images and hand-pick the works they would like to utilize. Here, Elgammal claims that seventy-five percent of viewers thought the algorithm had been produced by a human artist.

This is a claim corroborated by an interactive lecture given at the Alan Turing Institute in London in the spring of 2019. In this situation, AI artwork was not limited to the constraints of paintings; poetry, prose, and music were also displayed. With each new slide, the presenter would project, side by side, art created by AI and human-made artwork. Using their phones, each member of the audience voted on which artwork they thought was generated by artificial intelligence. Every round, the votes were split 50/50. The audience was never able to agree on which was made by AI, by any margin. Can you?
Despite what your instincts may lead you to believe, the only work created by a human is the third. The first poem is a project by biophysicist Zach Scholl who decided to conduct a Turing test on his AI. The Turing test is a test of the ability of a machine to be undetected as a computer, indistinguishable from a human. For Scholl, this meant getting this poetry accepted into a literary journal under the guise it was written by a human poet. Scholl used a poem generator which works by compartmentalizing a poem into smaller constituents like stanzas, phrases, and nouns. "When a call to create a poem is made, then it randomly selects components of the poem and recursively generates each of those. For example, a generated title may look something like this:

```
#title=A #fruit=
#fruit=grape|apple|orange|banana|cherry|mango|kiwi|tomato|lemon|fruit
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In that case the title is generated as 'A' and then it looks up and selects one of the possible words to finish it before it returns 'A grape' or something similar." Using this method, Scholl's AI-created poetry was accepted by The Archive, the oldest student publication at Duke University.

While nevertheless a fascinating topic, one would be justified in feeling an undercurrent of alarm while reading this article. The quality of AI to be indistinguishable from a human is one of the hallmarks in reaching Artificial Superintelligence, the arrival of which is highly debated by experts in the field. Nick Bostrom defines ASI as an "intellect that is much smarter than human brains in practically every field, including scientific creativity, general wisdom and social skills." Compared to such an entity, human beings would have the intellect of an ant. The potential implications of this are both immense and unpredictable. As a society, we are losing control of AI. It may start as an entertaining novelty in the form of paintings and poetry, but what happens when super-intelligent systems don't share our motivations, desires, or hopes for the future of humanity?

References

Illuminating Health Disparities: The Untold Story of Black Women’s Pregnancies

Kacy Workman

It was just three years ago that Serena Williams, the No. 1 women’s tennis player in the world and the winner of 23 Grand Slam titles, gave birth to her first daughter, Alexis Olympia Ohanian. Over her 20-year tennis career, Williams has amassed millions of admirers around the world and currently has a net worth of about $200 million. Considering all of her wealth, success, and fame, it was assumed that she would receive the best healthcare in the world. Unfortunately, this was not the case. After giving birth to her daughter on September 2, 2017, Williams complained of having trouble breathing. Although she quickly notified nurses and doctors of her deteriorating condition, they dismissed her symptoms. Finally, after she demanded medical tests, the doctors found several small blood clots in her lungs, along with other medical problems threatening Williams’ life. Though she was treated quickly, her close run-in with death did not escape her, and she has since begun speaking out about her subpar medical treatment. Unfortunately, this is not an uncommon experience for many women of color, particularly Black women, in the United States.

Recent studies have found that Black women are 3-4 times more likely to die from pregnancy-related complications than White women. Researchers in the 1990s examined data surrounding specific pregnancy complications such as postpartum hemorrhage, finding that although prevalence rates were similar between White and Black women, Black women with these conditions were 2-3 times more likely to die than their White counterparts. Despite medical advances, these rates have not improved over time. Data analyses examining maternal mortality from 2005 – 2014 reveal that mortality rates for Black women have actually increased from 39 to 49 deaths for every 100,000 live births within that decade. It is harrowing to imagine the number of Black mothers that we have lost, and the mortality rates for Black newborns are equally devastating. The mortality rate for Black newborns is almost 5 times higher than the rate for White newborns; and shockingly, it has also been found that Black infants under the care of White doctors have 3 times the mortality rate of White infants.

This begs the question - what mechanisms are at play to cause these disparities?

Many may question whether these health disparities in pregnancy are actually about race, rather than socioeconomic status (SES), which has a known relationship with race in the United States. However, what Serena Williams’ experience makes clear is that having money, access to the best healthcare, and even fame may not protect Black women. One common method used in research has been to control for socioeconomic factors when investigating racial health disparities, and findings consistently show that SES does not largely impact adverse outcomes for Black women. One study even examined preterm birth, a common pregnancy complication that leads to a greater risk of infant death and disability, finding that higher SES is associated with lower preterm birth rates in White women, but not Black women. Considering both the research and real-life experiences of people like Serena Williams, it is clear that while SES might intersect with this issue, these disparities in pregnancy outcomes have more to do with race than SES. Luckily, there are various ways in which students, researchers, and physicians alike can tackle this problem.

Research dictates that there are many ways to help lessen these disparities. Studies have shown that medical students and physicians hold implicit biases that affect treatment, and diversity exposure over time has been shown to improve treatment outcomes for populations of color. Yet, it is important to note that although implicit bias certainly plays a role in the problem, diversity training is not the ultimate solution. Students can help by donating money to organizations that work to improve food security and proper nutrition in disadvantaged communities. Black women are more likely to experience food insecurity during pregnancy and have an increased risk of pre-pregnancy obesity, so donating to programs that combat these issues could help to improve the health of Black mothers before they give birth. Creating educational
programs within health systems aimed at facilitating prenatal care workshops for women of color could help to tackle this issue. Another important factor to consider is better representation of people of color in research studies, as well as the healthcare field. It has been suggested that people of color in health professions and research are more likely to serve underrepresented populations. Working directly with communities to use research to help solve their problems can build relationships with diverse community members and begin to mend the long history of mistrust between the scientific community and communities of color.

Ultimately, while thousands of Black women die every year due to preventable pregnancy-related complications, Serena Williams lived. Now, even years after her pregnancy, Williams still must live with the fact that one of the happiest moments of her life was almost taken away from her by systemic racism.

References
Passive Antibody Therapy: Potentially the First COVID-19 Treatment
Caterina Erdas

While the world anxiously waits for a COVID-19 vaccine, thousands of people are in critical condition, in need of help today. Scientists are wondering what tools they have now to prevent the spread of COVID-19 and help save the lives of patients in critical condition. Passive antibody therapy may be the solution.

An antibody is a small molecule created by the immune system to help fight an infection. Humans only obtain an effective antibody for an infection after they have become infected. Once the body is initially infected, a chain of immune system processes is set off, including the development of a specialized antibody. Through the process of trial and error, the body develops an antibody, creates millions of copies, and disperses them throughout the body in the bloodstream. An antibody has a specialized region that binds to the protein coating of a virus or the outer membrane of an invasive cell.¹

There are many types of antibodies that work in different ways to neutralize an infection. Some work by completely surrounding the infectious agent and preventing it from replicating. Other antibodies bind to the infectious agent and tag it for other cells in the immune system to kill it.¹ Once the infection is cleared, the immune system will keep creating that antibody for a short period of time, or for the rest of the human’s life. No matter the strategy, antibodies are a powerful and effective biological adaptation to fight an infection.

The idea behind passive antibody treatment is: Why re-invent the wheel? Humans who have just recovered from an infection, in our case COVID-19, will have high levels of the effective, specialized antibody in their blood. Theoretically, if you take the convalescent plasma (filtered blood that doesn’t have any blood cells but does have the antibodies for the pathogen of interest) from the recovered patient and inject it into a sick or susceptible patient, they will have the antibodies to fight off the infection. The immune system created a great treatment, so instead of synthesizing anew treatment, which takes a lot of time, doctors can give a plasma transplant from a recovered patient to a critical patient and potentially save their life.

Doctors and scientists have been trying passive antibody treatment for coronaviruses in general and with COVID-19. In SARS1 and MERS, studies showed that convalescent plasma administered early on in the infection improved the health of patients. In China, convalescent plasma was administrated to 10 COVID-19 patients, and all 10 patients showed improvement after 1-3 days of treatment. There are other similar studies that show promising results but have small sample sizes and study design limitations. While the extent of the effectiveness of passive antibody treatment cannot currently be determined, the data available suggests that antibody treatment is not harmful and could improve the symptoms of patients permanently.²

The first step to start treating many COVID-19 patients with passive antibody testing is scientific validation. Safety is the first question that scientists need to answer in a rigorous clinical study, followed by evaluating passive antibody testing effectiveness in mildly ill to critically ill adult patients, and finally children. After the extent of the treatment is characterized, a structural framework needs to be built to collect and distribute convalescent plasma. Recovered people from COVID-19 are not hard to find, but blood donation
centers are facing severe blood shortages because they have had to close their hospital locations.\(^2\) Scientific investigation and a solution to collect large quantities of convalescent plasma is needed before passive antibody testing can be widely administered. In conclusion, passive antibody treatment has the potential to save the lives of patients and prevent the spread of COVID-19 before a vaccine is created and distributed. If you contract COVID-19 and fully recover, look into convalescent plasma donation. Your donation could be invaluable in saving a patient with COVID-19 or fueling research for a long-term COVID-19 passive antibody treatment.

References


Salmonella: Clever Bacteria
Najnin Rimi

A recent outbreak of salmonella caused many grocery stores to recall their onions and many unknowing consumers to become ill. A major produce supplier from California, Thompson International Inc., had announced a recall on August 1st for all onion types distributed by the company starting May 1st of 2020. This caused a recall from over hundreds of grocery stores, even our familiar Kroger and Walmart grocery stores.

Salmonella infection begins with the ingestion of Salmonella bacteria. This typically occurs with food, especially undercooked food. By cooking the meat at a specific temperature, you kill microbes that may have been present. However, this should not be the step taken for recalled items as they should be disposed of immediately. Water has also been known to transmit salmonella, yet, salmonella is rarely transmitted from person-to-person. An investigation by the CDC reports that pets can also transmit the bacteria, including bearded dragons and hedgehogs. There were thirteen infections from eight states and thirty-two infections from seventeen states potentially from bearded dragons and hedgehogs respectively.

Salmonella is a rod-shaped bacterium that lives in animal and human intestines and is spread through feces. Once ingested, it passes through the stomach as it is known to survive its high acidity. The bacteria populate the intestines and seep into the tissue. Potentially, the bacteria can enter the bloodstream via the lymphoid tissue and spread throughout the body. This presents dangers to other bodily organs such as the brain or spinal cord, causing meningitis.

The mechanism of how salmonella infections occur is clever for the bacteria, yet dangerous for us. Salmonella enters the intestinal tract and then binds to a receptor on the surface of the membrane of the epithelial cells.

One way the bacteria enter the intestinal tract is by hiding inside macrophages, which are large cells that consume potentially harmful compounds in our body, after passing through the intestinal tissue. This allows the bacteria to escape immunity by its host. Thus, it’s another way for the salmonella bacteria to reach the bloodstream as the macrophages travel in our blood vessels. However, a large quantity of the bacteria dies upon their exit of the intestines.

The next step after entering the membrane of the intestinal surface cells is for the bacteria to continue to replicate and destroy the host cells. They live inside the epithelial cells where the bacteria produce a short-term anti-inflammatory response that has the potential to cause ulcers. They also produce toxins which prevent the intestinal cells from making proteins. Their entrance into the body signals to the production of proinflammatory cytokines, which promote an inflammatory response. However, these proinflammatory cytokines could be the reason for intestinal damage during a salmonella infection. An enzyme, known as adenylate cyclase, is activated which causes an increase in cyclic AMP, leading to liquids being secreted from the cell. Diarrhea is manifested from this response. Many other symptoms occur due to the immune system reaction and others occur due to damage from the bacteria.

Salmonella can be very dangerous, and so it is crucial to catch an outbreak early. Preventing a salmonella infection starts with basic hygiene such as hand-washing before eating, cooking, or touching your face. Currently, this practice has been augmented. Nonetheless, the pandemic should not be the only reason we wash our hands. Many living things can cause harm in our body, and Salmonella is only one of the grand sum, so it is vital to continue to practice good hygiene for the sake of our health and the health of others.

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When you clicked the scroll button to move through this magazine, your brain sent a signal through your spinal cord and to your finger. Nerves in your finger then sent sensory information back through the spinal cord to the brain in a fraction of a second. Every day, the spinal cord transmits messages between the brain and body at speeds of 270 miles per hour. The spinal cord allows us to walk, run, or swim. However, for 200,000 Americans who suffer from spinal cord injury (SCI), simply standing up is often not a possibility. This number rises by approximately 17,000 cases a year as a result of sports injuries, car accidents, motorcycle collisions, or falls. Unlike many cells in the body, the neurons in the spinal cord cannot regenerate after an injury, which means spinal cord injuries tend to last for the remainder of one’s lifetime. Scientists have proposed theories as to why SCI tends to be irreversible, and new studies show promise of potential cures for SCI in the future.

What Inhibits Spinal Cord Regeneration?

The spinal cord is composed of neurons, which contain long, threadlike appendages known as axons. Motor signals are able to travel through these axons, passing from neuron to neuron until the signal reaches its destination in the body. This signaling is hindered when axons in the spinal cord cease to regenerate after an injury; however, axons in the peripheral nervous system regenerate readily. By comparing axons in the spinal cord to the peripheral nervous system, scientists have proposed that certain inhibitory elements produced by the myelin surrounding the spinal cord prevent axon regeneration. Other researchers have compared the growing embryonic spinal cord to the stagnant adult spinal cord. In doing so, these researchers were able to isolate another set of molecules that may inhibit spinal cord axon regeneration.

Scientists have had some success in inducing regeneration by altering the environmental conditions of the spinal cord. For example, in 2001, researchers found that the molecule cAMP was involved in spinal cord maturation during development. By increasing the presence of cAMP in the spinal cord, the researchers observed increased spinal cord axon growth. Additionally, in 2000, researchers found that Nogo-A, a molecule associated with myelin, inhibited axonal growth in the spinal cord. The scientists were able to observe
axonal growth by blocking the receptors for these molecules.¹

A New Advancement in Spinal Cord Regeneration

Another theory as to why axonal growth is inhibited in the spinal cord has to do with glial scar tissue. Glial cells are responsible for the formation of myelin and they help protect neurons. After an injury, these cells form scar tissue in order to protect the spinal cord from harmful substances in the body.

Just this year, a team of researchers from Pennsylvania attempted to find a new way to induce spinal cord axonal growth by focusing primarily on the role glial scar tissue plays in inhibiting growth. Using previous research, the team concluded that the inhibitory environment created by glial scar tissue prevented axon growth. They hypothesized that if this inhibitory effect could be reversed, axons would be able to regenerate. Using fruit flies as their model organism, the researchers determined that increasing glycolysis (breakdown of glucose) in glial cells can help promote spinal cord regeneration. The levels of signaling molecules produced by the glial cells increase in response to glycolysis. These molecules can bind to receptors on nearby neurons, thus increasing the production of cAMP, which leads to axonal growth. The researchers then applied these signaling molecules to the spinal cords of injured mice to see if their results held. The mice that received treatment showed improved function and behavior, thus supporting the results of the study.²

There is still much research to be done on long term treatments for SCI and on the interplay of different factors involved with axonal growth. While a way to completely heal SCI is not visible in the near future, studies like these demonstrate that such a remedy is possible.

References
“A Fitbit For Your Brain”—Elon Musk, Sci-Fi or Attainable?
Ryan Cvelbar

Just a couple months ago, Elon Musk, the CEO of Tesla, SpaceX, and now Neuralink, debuted his enhanced design of the Neuralink, a wireless brain implant the size of a coin, which he plans to use to ultimately facilitate the achievement of a state of symbiosis between humans and artificial intelligence. Specifically, Musk envisions a world where we can control technology with our minds by connecting the neurons of our brains to the Neuralink and hence, digitally to computers. However, for right now, Musk is focusing on more pertinent medical applications in treating epilepsy, Parkinson’s disease, and paralysis. According to Science Focus, “At the launch, Neuralink’s CEO Max Hodak stated that the first patients would be those with quadriplegia due to spinal cord injuries. These patients will have four chips implanted, connecting with up to 4,000 different neuron”. According to Computers, Networking and Electronics Technology or CNET, the FDA granted Neuralink approval for “breakthrough device” testing in July of this year.

Much of the human brain still remains a mystery to even the most intelligent specialists in the field, but there are some things that we do know. The brain is responsible for controlling our organs’ functions, our thoughts, speech, memory, moods, actions, and the list goes on and on. Neurologists also have the brain mapped reasonably well, so they can pin movements and actions to particular regions of the brain. But, most importantly in understanding the science behind Musk’s new technology is the fact that everything that happens in the brain is governed by electrical signals that are relayed from one neuron to another through action potentials that travel down the neuron’s axon.

You may be wondering how exactly this micro-sized brain chip works. Well, simply put, the micro-sized wires of the Neuralink chip have multiple electrodes on their tips that allow them to record electrical signals that are fired between the brain’s neurons and transmit information to the chip to instruct external technology wirelessly through Bluetooth. According to Antonio Regalado, the speed and pattern of these signals are a basis for movement, thoughts, and memories. By being able to record and read these brain signals, the Neuralink can act on that specific sequence of signals. For example, if your brain’s neurons fire a specific sequence of signals telling your hand to press a button to turn on your phone’s screen, these same signals can be read by the Neuralink and the Neuralink will turn the phone on for you without you having to lift a finger. In a sense, our brain’s activity is a code that Neuralink deciphers and acts on, on our behalf. Applications like these would be especially beneficial for people who are paralyzed and cannot perform these tasks on their own, but it would also eventually enable the human-technology symbiosis that Musk is determined to achieve. “If you can sense what people want to do with their limbs, you can do a second implant where the spinal injury occurred and create a neural shunt. I’m confident in the long term it’ll be possible to restore somebody’s full body motion.” Equally as fascinating is the fact that the wires of Neuralink are designed to communicate back to the brain, with computer-generated signals of their own. Each Neuralink chip is able to connect to 1,000 neurons and a maximum of 10 chips can be implanted in a brain. Just for reference, there are approximately 100 billion neurons in the brain, so as you
might imagine the placement of these chips is crucial in treating the area of interest in the patient’s brain. Even more interesting is the fact that the wires must be within 60 microns or .06mm from each nerve or the signal will not be detected. While this necessitates cutting a small hole in the skull, the chip is so small that it is designed to sit flush with the skull’s surface so that it is not noticeable.

Although the technology behind Neuralink is not new, there are some things about the device’s design that excite neurologists. Science Force explains that Neuralink’s wires are thinner than a human hair and that these wires are what connect the neurons of the brain to Neuralink’s 4-millimeter chip. Neuralink is implanted by the, “sewing machine,” a term coined by Musk himself, referring to the surgery robot that he built for the sole purpose of implanting the ultrafine, flexible threads of his device into areas of interest in the brain with pure precision. The robot even avoids blood vessels in order to minimize any inflammatory response. Musk sees this procedure as being as simple as LASIK eye surgery in the future and would like to be able to eliminate the need for general anesthesia. Additionally, Antonio Regalado states that the link’s design allows its user to charge it wirelessly through the skin at night and its small size makes it easier to remove and replace with a newer version as the technology improves. In addition to this microengineering and surgical feat, Elizabeth Lopatto believes that perhaps the biggest advance is Neuralink’s flexible threads which are less likely to damage the brain than the ridged spikes currently used in BrainGate, a brain-machine interface (BMI) used for quadriplegics. Specifically, the stiff needles of current BMI’s are problematic for long-term functionality because the brain shifts in the skull, but the needles of the array don’t, leading to damage. Lopatto explains that the thin and flexible polymers of Neuralink solve that problem and even allow for a much higher volume of data to be collected and transferred because Neuralink’s threads have more electrodes than current BMIs.

Musk boasts an endless list of benefits and applications of his medical device, but how realistic are they? He claims that eventually the Neuralink will be able to treat memory loss, hearing loss, blindness, paralysis, depression, insomnia, extreme pain, seizures, anxiety, addiction, strokes, and brain damage. According to Musk, Neuralink can measure temperature, pressure, and movement and warn you about a heart attack or stroke based on the data it collects. Musk even sees people being able to save and replay memories on demand as he states, “You could basically store your memories as a backup and restore the memories. You could potentially download them into a new body or into a robot body.” Other far-fetched applications include visual prosthesis, “non-linguistic consent consensual conceptual telepathy,” the elimination or minimization of pain, disease prediction and prevention, solving mental illnesses including anxiety, fear, and depression, and improving our understanding of consciousness. While these promises sound exciting or even too good to be true, it’s because they are, or at least for now they are. Antonio Regalado argues that significant knowledge about what electrochemical imbalance creates each condition or disease still needs to be developed before we can attempt making these applications a reality. If Neuralink is to be successful in the future, it will need to learn from preexisting BMI technologies and the challenges that they have faced in implantation and preservation. Even though the realization of these applications may be farther away than we may like them to be, they hold great potential for revolutionizing not only the way we think about the human-AI connection, but also the way in which we use technology within the medical field.

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COVID-19 and Campus Life: Student Perspectives
Ryan Shah

The COVID-19 pandemic has caused unprecedented changes to campus life as students have adjusted to the hybrid class model and physical distancing framework. Simply residing on campus this semester has been a privilege; many Spiders, especially international students and students with pre-existing health conditions, could not come at all. Among students on campus, there are varying attitudes about how this semester of “Protecting Our Web” has gone. To document this historic semester, I interviewed three students in mid-October:

- Colin Sparkevicius, a senior from Pennsylvania majoring in business administration
- Tereza Hernandez, a sophomore from Virginia majoring in global studies
- Karthik Lalwani, a first-year student from North Carolina majoring in chemistry

What were your thoughts when you found out that we would be returning to campus for Fall?

Colin: I was really excited that I didn’t have to spend my senior year online. I knew that it wouldn’t be an ideal year, but just having the ability to be in person was kind of enough for me.

Tereza: I didn’t believe it at first. I really thought they were going to backtrack on what they said like a week before we actually showed up.

Karthik: I was pretty delighted to hear this news, because I had a lot of friends from high school who didn’t get to go to their schools.

Did you expect us to remain on campus for the whole semester?

Colin: I expected us to shut down, given how some of the other universities were sending kids home after only the first week. I imagined it would be pretty early for us too.

Tereza: I thought we were going to get sent back after maybe two or three weeks maximum.

Karthik: When I spoke to my friends back home, we were thinking that even our smaller schools would not make it more than four or five weeks.

How have your perceptions of life on campus evolved over the semester?
Colin: My first impressions were kind of what I expected. Everyone was really following the protocol. I assumed we would have moved into Orange Phase sooner than we did. I also assumed we would be doing more prevalence testing.

Tereza: Before, I thought that it would be pretty pointless to come to campus. But now, it helps a lot to see people that I know, instead of just being trapped in my house. Since we moved to Orange Phase, more clubs are starting to get together too.

Karthik: I was surprised that we didn't have much of an influx in cases when moving to campus. In the freshman dorms, I noticed that there were some gatherings in the initial weeks, and I was expecting there to be a huge spike in cases. But that apparently never happened, and I am less worried about a spike happening now.

How have you stayed connected with friends?

Colin: My friends and I have been social distancing on the IM fields or patios to talk and eat dinner, which is pretty fun. To be honest, I don't really get together with a lot of other people besides my main friends that live in the apartments. Interacting with other people is generally through either classes or clubs. The organization SpiderBoard that I'm in recently started meeting in person now that student organization guidelines have changed. We had an in-person event last week that was really successful.

Tereza: I'm in a capella, and we did Zoom meetings for new members that were auditioning. Recently, we started rehearsing in person on Sundays, which is helping a lot.

Karthik: I attended a bunch of Zoom meetings for clubs I was interested in. I also had a couple in-person activities. There's this dance club, Bollywood Jhatkas, and I was able to meet like-minded people there in person.

How many classes do you have online? How has your learning experience been affected?

Colin: I'm really fortunate to have all my classes in person. I have a class in the Robins concourse, which is the concessions stand area. Academically, I feel like it's pretty much the same for me besides the weirdness of adapting to the hybrid model.

Tereza: Only one of my classes is online. In the classes that I have in person, I feel like I pay attention more. In my online class, the only reason I'm kind of engaged is because she divides us up into groups every class, so we actually get to know people.

Karthik: Two of my classes are completely online. Being able to focus in online classes has not been particularly difficult for me, but I definitely prefer in-person learning. One thing that has affected my classes is wearing a mask because I'm taking Spanish, so it's difficult to understand and pronounce words. Besides that, my in-person classes have been fine.

What do you miss most about a normal semester?

Colin: I just miss being able to do certain things without fear.
Tereza: Academically, I miss face-to-face office hours with professors. In person, they get to know you a bit better, and that’s kind of the whole point of having a small class size. Socially, for a capella, it’s really weird to sing with a mask on.

Karthik: I’ve heard great things about the amazing dining hall options that were available before, and I feel like I’m missing out on those currently.

Assuming the pandemic is ongoing, what would you like to see done differently in Spring?

Colin: There's just a lot of spaces on campus now that are restricted. Social spaces you used to be able to book are just classrooms. Social spaces now are under tents, which is not ideal if you're trying to push social life on campus. We should obviously keep having masks on and social distancing, but the locations themselves, I think, should be a little bit more open.

Tereza: I think the dining hall options are something I want them to work on a little bit more. We get a lot of food and stuff, but I think some of the options get really repetitive, especially for people who have dietary restrictions. I can’t have pork, so some nights are difficult.

Karthik: One thing is the school’s policies regarding breaks. I feel like it’s been difficult to maintain social connections and other things to reduce stress. The fact that the fall break was taken out of this semester might have had an impact for some people. I hope that there's some possibility they could add some sort of break in the spring.

Overall, what would you rate UR’s COVID-19 response on a scale from 1-10?

Colin: Let's see... probably a seven.
Tereza: An eight.
Karthik: I’d probably give it an eight. It's been good to see the university's willingness to bring us back on campus, and we have maintained it pretty well. In the spring semester, I'm not too worried about how the university is going to deal with it. I think they've got it down pretty well.
Thank you to our awesome Osmosis team members!

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