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FROM ONE BRAIN
TO ANOTHER

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"Have you ever wondered how your brain works? We have, too. We'd like to share some information that may interest you, from our brains to yours!"

Welcome back to "From One Brain to Another": a student-run neuroscience newsletter at York Univeristy, Toronto, Ontario, Canada. This newsletter is dedicated to its curious readers who would like to learn about the intricate, alluring discipline that is neuroscience. Included are student-written research review articles which discuss various topics within neuroscience in narratives reflecting other subjects, such as computer science, biology, and philosophy. We hope you may appreciate how interdisciplinary neuroscience is, and realize that there is room for everyone. With great thanks to the students and staff involved in the developing process, this newsletter also serves as an opportunity for passionate students of all disciplines to obtain research experience and grow into becoming specialists of their fields. Information about programs, such as that of neuroscience, its faculty, ongoing research and opportunities at York University are sprinkled within these pages for the benefit of our audience and future students. **It should be noted that all articles and content contained within this issue are not to be taken as medical advice; the information is collected research communicated by students strictly for educational purposes.**

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February Opportunities, and Events at York University: CIAN, CVR, and the Neuroscience Society.

A Grateful Thank You

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Student Research Reviews

Edited by: Jana Alagha, Hana Sopel-Mizrahi

Effects of Type 2 Diabetes on the Aging Brain

By: Anthony Adams

Often, we think of diabetes in terms of our understanding that there is a homeostatic relationship between glucose and insulin. What we don't stop to consider is how diabetes affects the brain either directly or indirectly. Diabetes in people aged 50 and older can slowly change how they think, such as planning, paying attention, and forming new memories. These behavioural/cognitive changes reflect the biophysical changes within specific parts of the brain, such as those that help with memory and behaviour control. Such parts include the hippocampus, the frontal lobes, and the white matter tracts between brain regions. Not every person is affected in the same way; however, research based on large groups of older adults aged 50 and older with type 2 diabetes shows there are clear patterns of memory and thinking problems over time. There are many factors that are linked to type 2 diabetes and cognitive decline, and if not monitored, they can have some major effects on one's everyday life.

Type 2 diabetes is a long-term condition in which the body does not respond properly to insulin, a hormone that normally helps move sugar from the blood into cells as an energy source. When the body becomes resistant to insulin or does not make enough of it, blood sugar levels remain relatively high. If this goes unnoticed, it can potentially lead to prediabetes. This damages blood vessels and sensitive tissues, including brain cells. In people over 50 years old, chronic high blood sugar and blood vessel damage contribute to changes in brain structure and function, which then manifest as problems with memory and thinking in regular activities.

A review article by Biessels et al. (2013) explained that older adults with type 2 diabetes tend to score lower on general thinking tests and show faster decline over the years than the control group: people of the same age, neither diabetic nor prediabetic. General thinking tests evaluate cognitive skills like memory, attention, and problem-solving. They give an overall picture of how well the brain is working. This review also described how diabetes in late life is linked to a higher risk of dementia, including forms such as vascular dementia and Alzheimer's disease, which are both conditions in which a person's memory and thinking worsen enough to affect one's independence, self-assurance, and daily life.

It must be clarified that "Dementia" is a broad term used when a diagnosed patient has serious problems with memory, along with other cognitive skills, such as language, planning, or recognizing people. It is not a normal part of aging because in dementia, the changes in the brain are large enough that they interfere with everyday activities, like managing money, taking medications correctly, or finding the way home. Sometimes, these symptoms are mistaken for

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the consequences of aging. It's important for a doctor to properly evaluate a patient with these symptoms, as they result from significant changes and damaged areas of the brain. If it is not identified at an early stage, this may lead to accelerated changes that make challenging experiences a regular occurrence, such as troubles with money management, administration of medications, navigation, and more.

Vascular dementia is a type of dementia that happens when repeated small strokes or another source of long-term damage to small blood vessels in the brain destroys patches of brain tissue. This leads to problems with thinking and memory.
Alzheimer's disease is another common type of dementia; it mainly affects memory and navigation. Its beginning symptoms start as memory troubles and progress with the disease. The development and progression happen when there are abnormal clumps and tangles of certain proteins inside and between brain cells, especially in regions involved in memory and thinking, which slowly kill those cells. This process usually starts in areas that support memory, then spreads to other regions, which can develop difficulties with language, problem-solving skills, and basic daily tasks over time.

When discussing these brain diseases, it should be understood that protein buildup means that certain proteins normally present in the brain start to accumulate in large amounts, and in the wrong places. In Alzheimer's disease, for example, the amyloid protein forms sticky plaques between nerve cells, and the tau protein forms twisted fibers inside neurons/neuronal cells. These protein deposits interfere with how brain cells communicate and survive, and over time, they contribute to cell death and brain shrinkage, which then causes memory and thinking problems. This is the process of dementia brain deterioration.

Interestingly, one important way in which diabetes affects memory in older adults is through changes in the hippocampus. The hippocampus is a small, curved structure deep in the temporal lobe (located in the region of the temples in the brain) on each side of the brain. It is essential for the formation of new long-term memories of events, such as what someone said earlier in the day or where an object was placed. Long-term memories are previously short-term ones that have been processed and stored in the brain for access. With increased access to these memories, they become further ingrained/stored. Samaras et al. (2012) reported that brain imaging studies often find smaller hippocampal volumes in older adults with type 2 diabetes, and that this smaller size is associated with worse performance on tasks that require learning and recalling lists of words or short stories. In practical terms, this can look like forgetting recent conversations more often or struggling to remember new information, while older memories from years ago remain relatively intact.

The hippocampus is very sensitive to the quality of our blood flow, high blood sugar, and insulin resistance. If any of these characteristics are no longer at their baseline equilibrium, it quickly interferes with hippocampal activity. Blood flow refers to how well blood moves through the vessels to deliver oxygen and nutrients to the brain tissues. A study conducted by Biessels et al.

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(2013) described that chronic high blood sugar damages the small blood vessels that supply the hippocampus, and can lead to increased levels of inflammation and oxidative stress. These are forms of chemical damage caused by reactive molecules in cells. Over time, these processes can make hippocampal neurons, the nerve cells in this area, less efficient or lead to their loss. This indicates that people with long-standing diabetes may gradually develop difficulties forming and storing new episodic memories, which are the memories of daily life events.

A second way in which diabetes affects memory is by slowing down thinking processes and disrupting executive functions, which are cognitive skills primarily dependent on the frontal lobes. The frontal lobes are the large regions of brain mass directly behind the forehead. The frontal lobes are known to support higher-order processes, such as planning, decision-making, focusing attention, switching between tasks, and working memory. Working memory is explained as a means of holding and manipulating small amounts of information over a short period, like remembering a phone number or doing mental math. Furthermore, Biessels et al. (2013) have found that older adults with type 2 diabetes often perform worse on tests of executive function, such as measures of processing speed, verbal fluency, and cognitive flexibility, compared to older adults without diabetes. In everyday life, this may appear as needing more time to understand complex instructions, difficulty organizing activities, or being easily overwhelmed when many things happen at once.

These executive function problems are related not only to the frontal lobes themselves but also to white matter: bundles of nerve fibers that act like communication cables between different brain regions. Each nerve fiber is coated in a fatty substance called myelin that helps electrical signals travel quickly, so damage to white matter can slow or interrupt communication between distant parts of the brain. In 2012, Samaras et al. explored the relationship between small blood vessel health and brain health in individuals with type 2 diabetes. What they found is that chronic damage to these vessels directly causes white matter lesions that are detected through brain imaging scans. Upon evaluation of the brain imaging data and cognitive tests, a correlation was made between the presence and severity of these lesions and a participant's performance. Participants performed more poorly for attention and executive functions, which suggests the white matter tracts between the frontal lobes and other regions are impacted. Because executive functions are important for managing daily memory tasks, such as remembering to take medications on time or following multistep plans, changes in the frontal lobes and white matter can strongly affect how memory problems show up in real life.

A third important pathway involves vascular and structural brain changes, such as blocked blood vessels, which cut off oxygen and nutrients to brain cells, increasing the risk of dementia in older adults with diabetes. Vascular changes refer to problems with the blood vessels, such as the thickening of vessel walls, the narrowing of the vessel canal, or most severely, the blockage by clots, all of which can reduce or cut off blood

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supply to brain tissue entirely. In contrast to vascular dementia, Alzheimer's disease involves deposits of abnormal proteins, such as amyloid and tau. It also involves widespread loss of neurons in regions critical for memory and thinking, including the hippocampus and parts of the temporal and parietal lobes.

Biessels' group reviewed large epidemiological studies that have examined patterns of disease in large groups of people. Their findings reaffirmed/affirmed that type 2 diabetes is associated with heightened risk of developing vascular dementia or Alzheimer's disease. A big indicator was that milder cognitive impairment preceded dementia. Cognitive impairment means that thinking and memory are worse than expected for age, but not yet bad enough to be considered dementia. These risks are influenced not only by high blood sugar itself but also by related conditions that are more common in diabetes, such as high blood pressure and high cholesterol, which can further damage blood vessels in the brain.

As we get older, it's common for elderly people to forget where they put their keys or might forget that they're booked for an appointment. A study done by Avila et al. (2021) followed older people over time and found that those with diabetes had steeper declines in overall thinking scores than those without diabetes. The term cognitive trajectory refers to how a person's thinking abilities change as they age, either staying stable or getting worse more quickly. Their work supports the idea that diabetes does not just raise the risk of dementia in a distant way, but actively shapes the path of cognitive aging across later life. Brain imaging studies discussed by Biessels et al. (2014) and Samaras et al. (2012) show that older adults with diabetes often have reduced total brain volume and more white matter lesions than those without diabetes, and that these structural changes are linked to lower scores on standard cognitive tests and faster decline over time.

When vascular damage, hippocampal atrophy, and frontal and white matter changes all occur together, the combined effect significantly increases the risk of developing a clear dementia syndrome, rather than only mild memory complaints. Subtle changes of memory or changes in thought can often be minimal. However, it's always good to take good care and pay attention to those changes. Monitoring personal mental and physical health is a healthy habit to maintain in life, whether you have diabetes or not. Every good choice or habit you make will take care of your brain and, therefore, you. Take care of your brain now so it takes care of you later with age.

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Music's Protective Power Over the Aging Brain: Interesting Insights from Dr. Claude Alain's Research

By: Jana Alagha

Music is the ***ultimate*** *brain workout* (Alain, 2025). This was the fundamental message of *Dr. Claude Alain*'s virtual presentation on October 6th, 2025. What happens to the brain as we get older? Can anything slow or minimize the effects of cognitive decline (i.e., a poorer quality of thinking, memory, and other cognitive functions of the brain)? These are questions that have long motivated cognitive neuroscientists to explore how the brain changes as we age, and to determine what certain factors play a role in slowing down cognitive decline. According to Dr. Alain, one of the most powerful tools in preserving the aging brain's cognitive health is ***music***.

Dr. Alain is a cognitive neuroscientist, senior researcher at the Rotman Research Institute, and professor at the University of Toronto. His field of work revolves around how the human brain perceives, attends to, and recalls sound. Moreover, he focuses on auditory cognition across one's lifespan. In a recent presentation, he presented the harsh reality of aging, and in contrast, the surprisingly positive evidence that shows music can aid in strengthening and preserving the brain's vitality.

The Bad News Regarding Aging

During the presentation, Dr. Alain points out the challenges that accompany aging:

- Vision becomes less sharp; acuity declines due to physical aging
- Sense of smell grows faint, leading to the detection of fewer scents
- Touch sensitivity declines, making one less conscious of physical sensation
- Hearing gradually deteriorates, making sounds harder to hear

All of these sensory losses often occur in conjunction with deteriorating memory and reduced information processing speed. We understand this as brain structure directly relates to function. With aging, the volume of brain mass can decrease, leading to the loss or interruption of cognitive processes. However, some parts of the brain remain resilient to such changes, mainly those like vocabulary and wisdom gained from life experiences. This tends to happen because the cognitive abilities that we use daily are reinforced with every use, making them resilient to cognitive decline (Tucker et al., 2022).

The Good News Regarding Aging

Despite the downsides mentioned above, there is also good news: that aging and its effects on brain health are flexible! Lifestyle impacts brain health. Therefore, a healthy lifestyle, such as one with a balanced and healthy diet, consistent and moderate exercise, activities that encourage social interaction, such as volunteering, playing card games, and even speaking two or more languages, boosts overall brain health and slows decline. According to Dr. Alain's findings, music is the best way to enhance and maintain brain health. Think about it this way: when playing an

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instrument (e.g., piano, violin, guitar, etc.), your brain recruits many regions for you to be able to play smoothly, and it increases the amount of brain activity taking place.

Let's break it down:

When playing an instrument, like the piano, the following brain regions are activated:

- Auditory regions (Primary Auditory Cortex) in the brain are active when playing, so you can hear and process the sounds being generated.
- Visual regions (Primary Visual Cortex) are active when you read the notes or look at your fingers moving.
- Motor regions (Primary Motor Cortex) are active to control fine finger movements, ensuring you are not pressing the wrong key or playing the wrong note.
- Frontal regions (Prefrontal Cortex) are active when you are playing a piece from memory, or when you are trying to remember where each key is.

Such multitasking and increased activity in the brain contribute to stronger neural efficacy.

The Unique Brain of Musicians

It has been evident that musicians perform more accurately and easily compared to non-musicians in fine-detailed tasks like recognizing minuscule pitch differences, processing rapid changes in sound, and distinguishing speech within noisy environments. Their reactions to sound are faster, stronger, and more accurate.

An attentional blink task is one that presents a series of stimuli, usually numbers or letters. Among them are two target stimuli, and the participant is asked to identify the second target stimulus that presents itself after the first target stimulus. This is important as the brain exhibits a blink in attention as it processes the first target stimulus, and this interrupts the observation, and therefore the identification of the second target stimulus. In other words, this task measures the brain's inclination to miss the second target if it appears right after the first target due to being preoccupied with processing the first target. Dr. Alain utilized this task and found that non-musicians often miss the second target, whereas musicians do not. This highlights that musicians are more attentive and focused.

In addition to that, brain imaging studies have brought to light that musicians use less brain effort to accomplish the same quality of performance as non-musicians. They have enhanced activity in the auditory regions of the brain, and heavily rely on executive control networks– brain regions that are important for higher-level tasks involving attention. Hence, musicians outperform non-musicians in tasks that highly demand decision-making skills, an inhibitive quality, or great attention to detail.

Music as a Protective Shield Against Aging

Sensory decline is experienced by everyone as they age, but the rate of decline differs across individuals. Pure-tone hearing thresholds– volumes of sound that must be reached to be sensed by the person– increase equally with age, regardless of musical training. However, in tasks that

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require the ability to make quick, perceptually-based decisions, such as detecting speech among a noisy background and differentiating between closely spaced sounds, musicians illustrated a notably slower rate of decrease (Zendel & Alain, 2011). This was depicted in Zendel & Alain's (2011) study, which showed that a 67-year-old musician performed similarly to a 47-year-old non-musician in speech-in-noise tests.

The Mechanisms Behind this Phenomenon

Dr. Alain suggests music has such an impact by two mechanisms: Bottom-up enhancement and Top-down compensation.

Musicians have enhanced bottom-up processing (data-based processing), which means they can easily detect and respond to auditory stimuli quickly. Bottom-up processing happens during the first phase of hearing, in which the ears and brain process the pitch, timing, and frequency of the sound. It resembles building a sound from the ground up, starting with its initial, basic parts. This system has been trained and reinforced in musicians over the years by listening to and following rhythms. Due to this enhancement, their brains become more efficient at grasping minute details of sound. In other words, musicians are more sensitive to changes in their environment, and that quality of attentiveness helps keep their brains sharp and healthy. According to Alain (2025), learning music as an adult helps the brain maintain its accurate and quick processing of sounds. Thus, older adults who train musically can hear sounds more clearly and pick up small details that non-musicians might miss.. This is a clear representation of what bottom-up enhancement is: the earliest neural responses to sound remain fast and precise. Additionally, bottom-up processing shows how clearly the brain represents a sound wave and encodes it. Musicians have demonstrated they can accurately decipher sounds while producing minimal brain activity- a physical portrait of the efficiency their neurons have developed through musical training and practice. Therefore, musical training keeps the auditory system’s foundation strong, making the brain sense and capture sound details before the sound can reach their conscious awareness.

The other mechanism is referred to as compensation. In this mechanism, top-down processing (knowledge-based processing) is involved. Top-down processing happens when the brain resorts to thinking, memory, and problem-solving skills to make sense of a stimulus (e.g., sound). Think of it as the brain stepping in to fill in the gaps when the sound is not clear enough- or has not yet finished. For musicians, the brain regions responsible for top-down processing work more productively. Even if their ears do not manage to pick up a clear sound signal because of age-related cognitive decline, their brains compensate for that by focusing better, inferring what the sound could be, and utilizing past encounters to decipher it. An example of this could be finishing a certain sentence or word for someone, or recognizing a certain song before the lyrics have begun. Using functional magnetic resonance imaging (fMRI) and advanced electroencephalography (EEG), Dr. Alain’s team continues to study how these mechanisms work hand in hand to encourage healthy aging.

Conclusion

Dr. Alain’s presentation draws a hopeful picture, claiming that music doesn’t just enrich life; it shields the brain from the disadvantages of aging. Engaging in music training, playing any

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instrument, or even singing can help in preserving listening skills, strengthening attention, supporting memory, maintaining social skills, and possibly delaying cognitive decline. A famous British Neurologist, Dr. Oliver Sacks, once said, “Music imprints itself deeper in the brain than any other human experience.” In a world where aging is coupled with challenges, particularly cognitive decline, music provides something special: an accessible, fun, easy, and scientifically proven way to remain mentally sharp. So, pick up an instrument and engage with music to age gracefully.

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Graduate Students at York University

Thursday, December 4th, 2025.

Interviewed by Jana Alagha: 3rd year undergraduate student in the Neuroscience program



Kristen Lott: Fourth-Year PhD Candidate

"Can you please introduce yourself, and tell us about your work at York University?"

I am in my fourth year of my PhD in psychology (Brain, Behaviour, and Cognitive Science stream). I work in Nikolaus Troje's Biomotion lab, which is an interdisciplinary vision science lab that has everything from biology and computer science students, to psychology. My research right now focuses on understanding social gaze behaviour; why we make eye contact, at what points during communication do we make eye contact with each other, and how different types of computer-mediated communication platforms, like Zoom, impact our ability to use our eyes as communication tools. I also look at how video communication impacts downstream social cognitive effects of perceiving eye contact, such as physiological responses to eye contact, but also, higher-order effects, like the amount of trust you have for someone after having a Zoom call versus face to face.

"How about we go a little bit into the past, now. Can you tell us how you got to this point in life, and what you did for undergraduate study?"

I did both my undergraduate and master's in psychology. In my undergrad, I always knew that I wanted to be in the realm of psychology, but I definitely thought that I was going to go into clinical psychology. Mainly because that's the area of psychology that ends up being most advertised. For example, you watch TV shows like Criminal Minds and you're like, 'I could totally be that person, that helps the police find the serial killer.' Or, you know, hear about others in your life going to therapy and think that you could do that: help somebody process their trauma. But then in my undergraduate, I took both research methods and statistics courses, and I realized that I really enjoyed the process of research and the scientific method; having a question, formulating a

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hypothesis, and devising an experiment to test that hypothesis. Then, doing it all over again when you find a result that doesn't quite make sense. I also ended up taking a couple of cognition and neuroscience courses and realized that that was kind of more the direction that I wanted to take from there. So, while I had a fairly straight road in that I wanted to be in psychology, it kind of changed as I learned more about myself and learned more about the general discipline of psychology. In addition to course work, I also ended up doing my undergraduate honour's theses with one of my previous statistics professors who did some research in the area of social cognition. I must have really enjoyed the research that he was doing, as I ended up staying in that lab for three extra years for a Master's degree.

I was at Trent for my undergraduate and Master's degree. However, they didn't have a PhD program in psychology at the time, so I applied to different places and eventually ended up getting into York and took the position because of the vision science research going on here. The process of applying for a PhD was a little bit crazy because I was doing it during COVID. When I was first applying, it was during a time when researchers were back on campus but we couldn't run in-person participants, which was my main data collection method at the time. I ended up having to rearrange my entire Master's thesis; moving it from in-person to online, which ended up making my data collection take longer as a result. In the second year of my Master's, I applied for different PhD programs, but didn't get into the programs that I wanted to. Truthfully, I just wasn't ready. So, I decided to stay on an extra year, gained a little more experience and maturity, completed further experiments, spent time writing up my research, and I managed to get into the PhD program a year after that as a result.

"Let's now look a little into the future; you mentioned you're almost finishing your PhD, what are you planning to do afterwards?"

I would like to move into industry. Particularly, I am very interested in user-experience research, especially work focused on human-computer interfaces. I enjoy using a lot of the hard skills that I've learned through my PhD research, which would provide a good basis for going into this line of work. For example, I enjoy processing and analyzing quantitative and time series data collected via devices such as electrocardiogram (ECG), galvanic skin response (GSR), and eye-tracking. As well, my research is very much about understanding how different types of technology and computer interfaces impact human behaviour and their experiences, and one of the challenges I find most interesting is figuring out how to quantify these subtle, even below-awareness, differences between platforms. A lot of the skills that I have learned are very applicable to understanding how different types of computer interfaces, like VR and point-light displays impact human behaviour.

"What advice would you give to undergraduate students, if they want to pursue a career in research, and take that route?"

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First, it's important to make sure that research is actually something that you're interested in. If you are that person, for example, that is sitting on the bus, observing people's seemingly random behaviour and coming up with questions or hypotheses about how they will act given certain constraints, research in social psychology may be for you. Mainly, if you have ideas or questions and want an outlet for answers - pursue research.

In terms of advice on how to do that? It really comes down to putting yourself out there when opportunities come up. Professors are always looking for help with their research and they always want students that are keen, interested, but also have curiosity in that professor's realm of expertise. Just put yourself out there; send that email asking to learn more about a lab or approach the professor that you're interested in working with - the worst thing that they usually say is: "Not right now, but we'll keep your CV on file". Ultimately, that will help you get your foot in the door, and when future opportunities do come up, you're more likely to be given a chance to learn how to do research in that area and have an outlet for your curiosity.

I would also say though, that your supervisor is important when starting out in research during your undergraduate, and very important when going through graduate school. Don't just find a supervisor that is in the realm of research that you're into, or one that has a lot of notoriety in that field. Yes, still make sure that you're interested in the work that that lab is doing, but find somebody that you actually get along with. Someone that is able to mentor you in a way that works for you. Because the difference between finding those qualities or not can make or break your passion for research.

"Do you find that age and experience affect gaze perception or eye contact behaviour? An adult, or a student like us, would understand a zoom call is just a platform for communication. But, little children, who had to start their elementary school years online in covid, they didn't understand that as much. I wonder if they decided that that was what reality was, so their transition to a real-life setting would be dramatic to them. I'd like to hear what you have to say to that."

I think the first thing to point out is how you are able to use gaze and eye contact to communicate during a Zoom call is not how you are able to use gaze in-person. Gaze and eye contact signals are sent and received, but the meaning behind these non-verbal cues is dysfunctional. That's mainly because of this offset that exists between the fixed location of the camera, and the dynamically changing positions of the users in front of their screens. This offset can be broken down into having two components. First, there's a constant offset that exists between the fixed camera placement, often at the upper edge of the screen, and where you and your partner are in front of your screens. You probably notice this any time you're on a Zoom call and realize you're never able to actually make eye contact with the person on the other end. You can either look at the person's eyes on the screen, and your partner feels like you're looking slightly downward, or you can look at the camera to make the appearance of eye contact, but you don't feel being looked

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at in return. So, you can never make genuine eye contact with your partner as you would be able to in-person.

Second, there's a dynamic offset in Zoom calls: when you move, how you see the person or object depicted on the screen change relative to the background doesn't change in the same way these movements would in-person. Whereas in-person, as you move in front of people or objects you see these objects from different viewpoints or perspective, in Zoom, these movement-contingent changes in viewpoint aren't captured. A person depicted over a Zoom call essentially behaves similarly to a person depicted in a picture – it doesn't matter where you move, they still appear to be gazing in the same direction. This is similar to what happens with the Mona Lisa, where it doesn't matter where you are positioned in front of the painting, it still looks like she is looking directly at you. As you can imagine, the lack of that dynamic changes in viewpoint impact the dynamics of eye contact behaviour.

So, going back to your question about how experience and age affect gaze perception over Zoom. Some work shows that with experience you can learn to compensate for the offset that affects gaze perception – but more so the fixed offset than the dynamic offset. You can learn to get around it. You know that if you want somebody to perceive eye contact from you, you can look at the camera. You can also learn to recognize that certain gaze angles in your partner's image imply direct gaze, depending on where the camera is place. Moreover, you can compensate for the lack of reliability in gaze cues, by using more gestures or speaking more directly. These are typically cognitively demanding, but can, and are often done to make up for communicative issues with Zoom.

I think for children, especially those who grew during COVID and have a lot of experience of communicating online over video calls, they've learned through that experience what seeing these moving images on a screen mean; that the person on the screen is someone they know and that person is reacting what they say and do in real-time. So, they've likely learned fairly quickly that Zoom is a communication tool depending on their age. Given that more experience leads to learning compensatory behaviours when using these platforms, these children may be more flexible in how they perceive and use communicative cues online versus in-person. Whereas older individuals have less experience with communication over these tools relative to the geometry of a face-to-face setting. So, the adjustment between the two may not be as automatic. Kids that have grown up in that sort of situation, and have a lot of experience with Zoom, I feel like they've learned the differences between these types of environments and may be more flexible in adjusting their behaviour or in accepting violations in natural space when communicating over these platforms.

"Did you find any connection between gaze movement and heart rate? When someone's eyes shift, or when they stop making direct eye contact, does that change the person's heart rate? Are there any correlations?"

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We do know from the literature that gaze behaviour, specifically eye contact, affects physiological responses, such as heart rate. When you perceive someone looking directly at you, a cascade of physiological changes tends to occur. These changes have been termed the "eye contact effect". Concerning heart rate changes, perceiving eye contact leads to heart rate deceleration, which is meant to reflect an attention-orienting effect. Eye contact is a social signal that indicates that a person is attending to you and that whatever they have to say next is important and intended for you. Since eye contact is important, you devote greater attention to the gazer and other socially relevant cues, and this enhanced attention is reflected in heart rate deceleration. Mind you, at the same time, other types of physiological responses are also likely to happen, which reflect this enhanced social processing when perceive somebody making direct gaze. For example, your palms get a bit sweatier and your pupils tend to dilate. All of these things come together to indicate that there's something substantial about making eye contact; it triggers you to get ready to socially interact. It's probably part of why we avoid making eye contact with people that we don't know in public spaces, like the subway – don't want to invite the potential of having to make small talk.

Now, the eye contact effect marks changes in an individual's physiology in response to perceiving eye contact. Interestingly, there's this relatively new avenue of research that suggests eye contact may be a trigger for the alignment of physiological responses between people, which is referred to as physiological synchrony. Essentially, when you are interacting socially with someone, your physiological responses, such as skin conductance, pupil diameter and brain activity, tend to align in time with that person. A lot of recent research utilizing various methods like EEG, fMRI and pupillometry shows greater physiological synchrony when making eye contact versus averted gaze and there's some work using event-related analysis that shows that synchrony tends to peak around the onset of eye contact. This suggests that eye contact may serve to realign physiological synchrony during social interaction. This makes sense, though, because eye contact is a unique reciprocal signal that is already known to impact people's individual physiological responses.

"Is that hypothesis generalized to all ages and genders, or do you think a certain age group would exhibit that more than the other?"

I don't know about age group, but I can say that relationship tends to moderate physiological synchrony. For example, people who are friends tend to show more synchrony in physiological responses during interaction than strangers. As well, children and their parents tend to synchronize their physiological responses. There are a few different theories as to what this synchrony means, but generally synchrony is thought to reflect a co-regulatory response. When interacting with someone, you are attuned to their emotive state, movements and gestures and you tend to mirror them but also predict them to help keep the interaction going smoothly. At the same time, when interacting, you typically engage in shared attention, where you attend to similar parts of the environment. So, if I make eye contact with you and then you look at the table to your left, I'm likely to follow your gaze and look at that able, as well. That shared attention means shared sensory sampling, which aligns physiological responses to that shared input.

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That is one idea about what being in a state of synchrony reflects. So when it comes to there being more synchrony among friends versus somebody you just met, it's likely due to you being more likely to be in a state of co-regulation; you're more often attending and attuning to that person. Another way, you're more likely to follow their gaze cues or mirror gestures of someone you like and trust.

"Is there any research that talks about whether oxytocin levels- which we understand that as you socialize more, you increase its levels, and that's good for you- plays a role into this behaviour?"

Physiological synchrony can be broken down into three different categories. First, there's neural synchrony, which refers to the alignment of brain activity between people. Second, there's autonomic nervous system synchrony. This is where autonomic responses, like heart rate variability or pupil diameter synchronize between people. Finally, and most relevant to your question, is hormonal synchrony which refers to the temporal inter-relatedness of hormonal levels, like cortisol or oxytocin, between people.

With hormonal synchrony, it tends to be something that unfolds over an extended period of time relative to other categories of physiological synchrony. The majority of hormonal synchrony work looks at hormonal levels of people in close relationships, such as romantic couple or child-caregiver relationships. For example, oxytocin levels of infants that are within the first six months of life tend to be positively correlated with oxytocin levels of their parent. So, hormone levels do synchronize with people that you're closer to. Now, whether hormone synchrony plays a role in enabling coregulation and synchrony of other systems? There is some evidence that suggests this may be the case. For example, one study showed that men who are administered oxytocin engaged in more eye contact. As we've already discussed, eye contact is an important affiliative behaviour that likely helps to synchronize other physiological responses. This may suggest that increased oxytocin between people can foster more co-regulatory behaviours between people, which could enhance synchrony in other domains.

"When you were talking about the feedback loop, and how one person's behaviour may stimulate the other and cause a change, would you say that this would be significantly driven by the limbic loop in the body, or are there other loops in the brain that have more contribution?"

So, from what I know, a lot of this co-regulation piece in physiological synchrony is strongly tied to the autonomic nervous system and, in particular, the vagus nerve. The vagus nerve plays a big role in linking what's happening in the brain with changes in the body, like changes in heart rate and other physiological responses.

That said, it may be oversimplified to think of it as one 'limbic loop' in this circumstance. Rather than one closed loop, it's more of a like a network of interacting systems. Cortical regions involved in perception, attention, and social cognition are continuously interacting with subcortical and

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brainstem systems that regulate autonomic output. The vagus nerve is a major pathway through which those signals influence autonomic regulation but it's one part in a broader brain-body feedback system.

"What really pushed you to study gaze and communication, and the psychology behind it?"

I should start by mentioning that my Master's and undergraduate research was on a topic that was fairly different to the research topic that I am studying now. For my undergraduate and Master's degrees, my research examined the mechanisms underlying self-control and the influence of boredom on later failures of self-control. When I was applying for PhD programs, at York I initially applied to work with another professor who studies boredom and executive functioning. I had worked with this professor before on a paper, but at the time when I was applying, he was transitioning his lab into being more clinically focused, and away from experimental cognitive psychology. I ended up not getting to be able to work with him, but my application got passed around the department and that was when my current supervisor approached me. He talked about the vision science research community here at York and the direction he was hoping to take his lab in the upcoming years. At the time, his research was shifting from studying biological motion into work on social gaze and communication. Initially, when he proposed the idea of joining the lab as the resident social psychologist, I mainly thought that it'd be a great opportunity to challenge myself in a new research area and gain technical experience with different types of data acquisition methods, like eye tracking and virtual reality. As I read more of the literature on the topic though, the theoretical side of how we use our eye gaze to both take in information and signal information to others became very intriguing. It was never a topic that I thought I would study, but it is one that I become more and more interested in the deeper I study. Much of the research in the area of social attention has been studied at the individual level; asking what visual information we prioritize to navigate our social environment. But in natural social environments, people are not just observers but are actors whose behaviour influences the behaviour of others. We cannot use our eyes to gain visual information without signaling information to others. Part of what pushes me to research social gaze is getting to understand how we balance the information acquisition and signalling functions of gaze and how our visual environment influences this balance.

"Lastly, what is one thing that you've learned in your research journey that fascinated you so much you'll never forget it?"

One interesting thing that I've recently learned was from a review paper talking about the difference between testimonies given online over a video call and those given in-person. One of the differences that they found between children's testimonies given between these two platforms, was that when children gave in-person testimonies, their story was judged by others as more plausible and reasonable versus the same testimony given online. One of the reasons the authors provided as to why these differences in the reliability of the information between video

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conferencing and in-person testimonies exist was that you are more likely to consider the emotional context in addition to the linguistic content of the testimony in-person versus online. In-person you're able to pick up more paralinguistic information like eye gaze and minute facial expressions that are otherwise unreliable or disrupted in video communication. Given that this paralinguistic information is unreliable online, you're more likely to focus and judge the linguistic content of what is being said, rather than how it is being said.

Have you ever wondered how we use our eyes and head to communicate? Our research involves collecting a large and diverse dataset to better represent natural behaviour in typical conversational settings. During the experiment, you and a confederate engage in a brief series of head and neck warm-up exercises followed by natural conversation about varying topics. Meanwhile, we record your pose with overhead motion capture cameras, eye gaze with wearable eye trackers, facial motion with an iPhone TrueDepth camera, and heart rate with an ECG chest band. As compensation, you will receive your choice of $15 or 1.5 URPP credits. This study takes approximately 1 hour to complete and takes place in designated York laboratory space, located in LSB 093 (the basement of the Life Science Building).
Contact Eileen Dadashi (email: eileen09@yorku.cs) to set up a timeslot or for more information!

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Neuroscience Professors at York University

Wednesday, November 27th, 2025.
Interviewed by: Hana Sopel-Mizrahi

Dr. Jeffrey Schall, Professor of Biology, Director of the York University Visual Neurophysiology Centre.



"Hello Dr. Schall, thank you for meeting with me today. I'd like to ask you how you came to be here. What was your academic process of becoming a professor, and, why neuroscience?"

As a high school student in a small farming town in Colorado, I had really good math and science teachers in our high school. Through their inspiration and the fact that I knew I had no future in football, I decided science was the path. I always had a strong curiosity about things, and a wonderment. I enjoyed reading, and a science fiction and non-fiction writer named Isaac Asimov was a popular writer at that time. Reading numerous books on science beyond the textbook, I learned quickly that the brain was the last frontier. You know, the major discoveries had been made in physics and chemistry, but how does a brain make a mind? That question is still to be answered. And so, I had an inspiration to have an academic career. Also, there was a small college down the road, and the high school chemistry teacher was married to the college chemistry professor, and it looked like a great life. Way better than farming.
I went the University of Denver and had a great opportunity to work in a laboratory that studied behaviour and the brain in rats. It was called at that time physiological psychology. Because the animal welfare regulations were different at that time, I had the opportunity to do hands-on experiments. Nothing was published, but it was just wonderful, to do the work and make discoveries. For my senior honours thesis, I got to work with a laboratory at a local hospital that was researching how seizures were caused by certain drugs that were used to treat asthma. And so, under the guidance of those advisors, I performed the surgery to put electrodes into the brains of rats and recorded the EEG signals before and after delivering the drug. It was a very primitive study, but I read other books on EEG and brain-behavior, and it got me started.

My PhD was earned in the School of Medicine at the University of Utah in Salt Lake City. I stayed in the west, because I didn't have mentors advising me that I could go anywhere else, really. The idea that I could go to Harvard, or MIT, or Stanford was just not conceivable to me then. I had

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been to the University of Utah during my last two years in high school. Our math teacher took a few of us to a large science fair organized by the University of Utah. We got to present our research projects, meet people, tour labs, and I was quite attracted to the research environment. And so, I went to the University of Utah to earn a PhD and began working in a lab that studied the structure and function of the visual system in cats. I learned to do neurophysiology in anesthetized, paralyzed cats, just like Hubel and Wiesel, and investigated how the retina contributes to visual cortex. But I remained interested in the mind-brain problem, which you cannot really study in an anesthetized cat.

I got my PhD in 1986, and I had learned about the techniques for doing neurophysiology in awake, behaving monkeys that had been developed in the 1970s. That was very attractive to me. I had the opportunity to do postdoctoral training in one of the laboratories that first used these techniques at MIT with an investigator named Peter Schiller. I was very fortunate to have funding from the NIH to support my postdoc, so he left me alone to do my research. This was part of the genius of his training style, which is hard to implement today, but, if he saw that you could do things, he just left you alone. I did an analysis of the areas that you learnt about in class. The frontal eye field, and the supplementary eye field. This is when the supplementary eye field had just been identified. It was part of a region called the supplementary motor area that was first described by the Canadian neurosurgeon Wilder Penfield at McGill. In the 1980s this part of the brain was attracting a lot of interest. My publication was the second paper on this part of the brain, really. I was able to step into this stage where there was not a lot known, and there was the opportunity to find out new things. I also had the opportunity to work with some really talented graduate students and other postdocs, at MIT, who remain lifelong friends now.

When I got to MIT, I met Rufin Vogels from Belgium and Nikos Logothetis who is Greek but earned his PhD in Germany. As we were getting acquainted, we talked about our motivations, and we all simultaneously agreed that we wanted to study the neurophysiology of perception, and not just sensation. You know, how does the brain create perception? As we talked more that afternoon, we realized that we were talking about the Necker Cube- you remember the cube that you can see two ways? We actually began thinking, "How would you train a macaque monkey to tell you whether he sees it this way or that way?" We couldn't figure out a way to do it that was reliable, because the monkey could… cheat. Well, a year or so later, we had the idea of using binocular rivalry. So, while I was doing the frontal lobe research, Nikos and I, had an idea to do binocular rivalry as a way of dissociating the presentation of the stimulus from its perception. And so, that worked out very nicely and we published a paper in SCIENCE. In my graduate work I had learned methods for determining how parts of the brain are connected. This led to another collaboration with another faculty member at MIT, Ann Graybiel.

Through this research work, I was able to get a faculty position at Vanderbilt University in 1989, where I established a laboratory, and, as we say, rose through the academic ranks. I was an

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assistant professor, and I got promoted to an associate, and then full professor. I was at Vanderbilt until 2021, formally. I joined the York faculty in January of 2021. It was COVID, then, so we didn't move to Toronto until the end of the year.

And now, the basic questions remain. My interest in the mind-brain problem, how do we perceive, remains? What's the link between mental attributes or capacities and the neural underpinnings? We investigate this by training monkeys to do complex visual tasks and monitor the signals produced by neurons. We also have been fortunate to collaborate with other investigators who have the capacity to do complex, computational modelling. I work with cognitive psychologists who build models of psychological processes, cognitive processes, that are formal, mathematical. We have monkeys do tasks for which there were psychological models and verify that the monkey's behaviour could be explained by the model. And then, when we have the neuron signals during the behaviour, we look for links with the math model.

"To give students who are not familiar at all with either your class or the neuroscience program, could you give an overview of what type of research and the types of projects you're doing, and whether or not your lab focuses on different research foci, or one in particular?"

There are cross-cutting, interwoven themes in the psychological capacities we are studying. One line of work is on, broadly, decision-making. More specifically, how do we decide where to look. We study this with a cognitive paradigm called visual search. Multiple things can attract gaze, so we have to process the image, figure out which one is important, and look at it. How does that process work? Especially when there are competing things to look at? Another is interested in how the brain knows what it did. The monitoring and recognizing when we make errors. "I meant to look over there, but I looked over here. That's not where I meant to look." How do you know what you did? We study this using a task called a stop-signal, or countermanding task that we talked about in class. This creates conditions where the participant makes frequent errors. Sometimes they may know they made it and say "oops" and sometimes they may not know they made it. We can investigate how the brain does that. We have found that one brain circuit is contributing to the selection of stimuli and production of movement, and another circuit emphasize monitoring and executive control. The monkeys do the tasks, and we record the neurons. We can describe what the neurons do.

Now, another important emphasis of our work for the last several years is using a probe that samples neuron signals across all of the layers of the cerebral cortex. This allows us to have a better estimate of what all the neurons are doing in a circuit because we're sampling with less bias. By measuring across all the layers, there are other calculations you can do, to estimate what's known as the current density. As neurons are depolarizing, currents are flowing in and out of neurons, and we can where current flow across depth, where neurons are more depolarized and less depolarized. This is useful information to understand circuits in the brain. But those depolarizations among a bunch of pyramidal cells that are aligned in the cortex, create a battery!

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They create a positive pole and a negative pole that creates an electric field that can be detected with electrodes on their scalp, and that's the EEG.

So, we're interested in not just what the individual neurons do, but what the EEG does to link those two levels of measurement. We know what EEG is, it comes from the brain, but we don't understand EEG as well as we understand the electrocardiogram (ECG). The ECG is really well understood. As a result of that, a cardiologist will read the ECG and diagnose heart problems because previous researchers described in detail how the ECG is produced. We don't yet have that level of understanding for the EEG from the brain, but it's there to be had! We just have to do the work to understand how some variation in the electroencephalogram relates to symptoms of some disorder. One of the best examples of this every day in medical centres around the world is epilepsy. The EEG, during an epileptic seizure, has a particular form and it's very informative. It helps the surgeon find the part of the brain to take out to eliminate the seizure. But what about schizophrenia or depression? So that's one of the major goals of our work, to understand how the EEG comes from the brain, and what it means in relation to symptoms.

"It's like trying to make a language out of the signals, is that right?"

That's right, and when you say language, what that means is there's some information to convey there. Now, neurons just make spikes, current density is just current, EEG is just voltage …. where's the information, where's the language? That brings us back to these computational models. The computational models that articulate what is being represented and communicated. It's a different level of explanation. So, we're talking about different levels of measurement, microscopic neurons to macroscopic EEG. There are also different levels of description: just like in the computer we're using right now, there's chips, with currents flowing- and that's all there is. But we don't talk about it at that level. We use Zoom. We click on links in webpages. We type on a keyboard that makes letters appear on a screen. When you send those letters to me, I can say, "oh that's a good answer, you get an A." So, the computational modelling is an essential component of this whole enterprise.

"On the matter of current depth; is this data a plot of different current densities, whose patterns would be associated with movements or neurological conditions?"

Your intuition is right about that, we make a figure that shows the signal through time, across depth. So, depth is on the y-axis, time on the x-axis. Then, let's go another level deeper. What we're measuring, are the voltages at each of the contacts at each of the depths. Then, deriving from those voltages, you get the current density, because Ohm's law--E = IR. The figures we can make will now be depth on the y-axis and time on the x-axis, but then we'll make colour plots where the intensity of the color is the magnitude of the current, and the sign of the current is the colour. Often, we'll use a hotter colour for depolarization and a cooler colour for repolarization. So, now if we're sampling from the part of the brain, let's say, that's involved in producing

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movements like primary motor cortex and it's time to move his arm, we would see the depolarization of those layer 5 pyramidal cells as a hotspot in the cell body, where it's depolarizing, to send the action potential down to the spinal cord.

"Does your lab accept students, or capstone students? Secondly, would you have any advice for students who are approaching professors and looking for a capstone position?"

I do mentor undergraduate students. The issue is, does the student know enough to have a meaningful experience? So, for our particular lab, everything is run by computer. To handle the data, means you have to program the computer in a pretty sophisticated way. There's a computer programming system called MATLAB. That's the common one that's used. So, if a student has had a MATLAB class, and statistics, and understands linear algebra, and time series—see, the questions we ask are based on a broad background of math, engineering, and psychology. There are other labs that are more suited for the undergraduate experience, because the techniques are more hands-on, more direct. I don't want to say less sophisticated, but just more accessible to the undergraduate students. But my lab has had many undergraduates over the years. The first undergraduate who worked with me at Vanderbilt is now on the faculty at Northwestern, as an NIH-funded faculty member.

"Can you share anything with us about the upcoming Neuroscience Building and its opening on the Keele campus?"

The new building will end up costing about $50 million dollars. This demonstrates York's commitment to neuroscience. The ground floor will be a vivarium to house the labs investigating macaque and marmoset monkeys. Four faculty will move into the spaces designed for the kind of work that each of the faculty members are doing. All the resources and equipment will be state of the art. Then, on the second floor, are those clinical psychology labs, because it's all related. And then next door, is the Sherman Health Science Centre, where, by the way, there's the 3T magnet for doing MRI. The monkeys get MRIs, and this is another pathway for us to relate the monkey work with the human work, by using common techniques and compare homologous brain regions under matched conditions.
This was part of the opportunity that attracted me to York, the opportunity to help finish the design of this building, to help recruit the new faculty who are populating the new building with us, and to see it come to fruition.

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November-December Neuroscience Seminars at York University

CIAN Seminars: Dr. Virginia Penhune

Friday, November 28th, 2025

By Valentina Dodaro

The last seminar for the month of November welcomes Dr. Virginia Penhune on behalf of CIAN (Centre for Integrative and Applied Neuroscience). Dr. Penhune is a founding member of the Montreal Laboratory for Brain, Music and Sound (BRAMS). Her work adopts a developmental perspective, including studies in children and older adults, as well as individuals with musical training.



Photo Credit: Denz Marieon

Language and music very often communicate with each other relying on predictive associations between sound and action. The broad aim of Penhune's research is to understand the neural mechanisms underlying auditory-motor integration and learning. Music is used as a model because in addition to its responsibility for subjective feelings of pleasure, its predictive associations between sound and action are critical for perception and production.

A central idea to the seminar was the brain's ability to perceive musical rhythm particularly the capacity to find and predict a beat. A related phenomenon is the experience of a musical "groove", the pleasurable urge to move in time with music. Penhune presented recent work from her own lab showing that beat perception and the experience of groove rely on motor planning regions in the auditory dorsal stream. This suggests that motor systems play an active role in shaping auditory perception rather than only responding to it.

In addition to cortical mechanisms, evidence presented by Penhune supports the importance of subcortical mechanisms, particularly striatal-cortical loops. These loops have been found to support different aspects of the groove experience, with separable loops contributing to the urge to move and others mediating the feeling of pleasure.

The results presented in this seminar are interpreted within the broader theoretical framework of prediction and sensory-motor integration. The data emphasise that musical rhythm and groove are shaped by dynamic interactions between auditory, motor, and reward-related brain systems.

Reference List

Virginia Penhune, VP. (2025, November 28th). *What I hear moves me: auditory-motor integration in the context of rhythm and groove*. https://www.yorku.ca/cvr/all-events/

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November-December Neuroscience Seminars at York University

CVR Seminars: Dr. David Brainard

Friday, December 5th, 2025

By Valentina Dodaro



Dr. David Brainard

The center for vision research welcomes Dr. David Brainard from the University of Pennsylvania. He received an AB in Physics (*magna cum laude*) from Harvard University in 1982, followed by an MS in Electrical Engineering and a PhD in Psychology from Stanford University in 1989. His research focuses on color vision, intrinsically photosensitive retinal ganglion cells, retinal imaging, as well as computational models of these systems.

Perceptual science is a field of study that focuses on how we sense and interpret the world. It questions how stimuli like light, sound and touch are transformed by our brains into meaningful experience. A long-standing question in this field is if relationships between stimuli can be described by using metric geometry. Euclidean geometry is the study of flat space based on the criteria of Euclid's five postulates. Detailed experiments in colour perception have ruled out simple Euclidean geometry as a complete account of suprathreshold color judgments.

Dr. Brainard explains the possibility that a flexible framework of general Riemannian geometry is capable of filling this gap. Riemannian geometry is the study of curved spaces where distance depends on location and direction, not only straight lines. The testing of Riemannian geometry has lacked firm conclusions because it requires the measure of a full characterization of colour discrimination thresholds for every colour and all directions of colour variation. Due to recent advances in machine learning these measurements are now possible. Dr. Brainard and colleagues have made comprehensive measurements of characterization of colour discrimination thresholds, enabling the computation of Riemannian geodesic distances between any two colors.

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November-December Neuroscience Seminars at York University

CVR Seminars: Dr. Brian Corneil

Friday, December 12th, 2025

By Valentina Dodaro

Dr. Brian Corneil, the guest speaker for the second CVR seminar of December, is a professor in the Departments of Physiology & Pharmacology and Psychology at Western University. He received his PhD from Queen's University in 2001, completed his postdoctoral training at Caltech until 2003, and then began his independent research career at Western. His research examines the neurophysiology of the oculomotor system, including the coordination of saccadic eye movements with orienting head movements to rapidly shift the line of sight. Dr. Corneil's recent work extends these techniques to the study of the fastest possible visually guided reaching. His work combines EMG recordings with a variety of complementary neurophysiological and psychophysical techniques in humans and animals.



Dr. Brian Corneil

Dr. Corneil brings attention to the fact that we as humans operate in a world surrounded by dynamic and unpredictable movements. Rapid adjustments in motor control are necessary to react to sudden changes in an object's position. Previous research has demonstrated that ongoing visually guided actions in humans can be modified at latencies approaching the minimal limits imposed by afferent (incoming) and efferent (outgoing) conduction delays. The existence of this fast visuomotor system has been recognized but questions remain regarding the underlying neural substrates and the relative contributions of cortical and subcortical pathways.

Dr. Corneil's talk focused on what his group has termed "express visuomotor response". These responses consist of brief bursts of muscle recruitment that appear in upper-limb muscles in less than 100 ms in humans and less than 65 ms in non-human primates. These short latencies severely constrain the opportunity for extensive cortical processing. This information leads to the hypothesis that these responses arise through tecto-reticulo-spinal signaling via the superior colliculus.

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Ongoing experiments demonstrate that visually related reaching signals emerge within approximately 50 ms in the movement-related layers of the superior colliculus, early enough to generate express visuomotor responses. These results create a foundation for comparative analyses of signal timing in frontal cortical areas.

The last part of Dr. Corneil's talk discussed recent findings showing that express visuomotor responses persist in Parkinson's Disease, a neurodegenerative disorder characterised by rigidity, tremor and slow movement due to the loss of dopaminergic neurons in the brain. These express visuomotor responses persist despite degradation of signals related to voluntary reaching. These findings suggest that a subcortical circuit, influenced by the cortex, generates the earliest visuomotor responses across different parts of the body.

Reference List

Brian Corneil, BC. (2025, December 12th). *Responding when time is of the essence: a subcortical substrate for rapid visually-guided reaching* https://www.yorku.ca/cvr/all-events/

Brain & Mind Institute, Western University. (n.d.). *Brian Corneil*. Western University. https://www.uwo.ca/bmi/investigators/brian-corneil.html

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February Opportunities, and Events at York University: CIAN, CVR, and the Neuroscience Society.

CIAN – Centre for Integrative and Applied Neuroscience: A neuroscience research group at York University; its aim is to collaborate as a unit on subjects including, but not limited to health, education, and the industry. The organization hosts research seminars, conferences and events for scientists and interested members of all academic backgrounds and interests, including the general public.

Upcoming January Seminars:

- **Friday, February 6th, 2026 @ 2:00pm-3:30pm** in Kaneff Tower, Room 519 | Daanish Mulla & Sabine Muzellec, York University

CVR – Centre for Vision Research: York University's specialized vision research organization that comprises of leading scientists and professionals who aim to conduct ground-breaking research and further develop training in this field. Research seminars and events are also hosted for the benefit of interested members of all academic backgrounds and interests, including the general public.

Upcoming November Seminars:

- **Friday, February 13th, 2026 @ 2:00pm-3:30pm** in Kaneff Tower, Room 519 | Kayrel Edwards & Cristina Rubino, York University
- **Friday, February 27th, 2026 @ 2:00pm-3:30pm** in Kaneff Tower, Room 519 | Dr. John Morrison, Barnard College of Columbia University

Seminars are accessible to the general public; anyone is welcome to attend these lectures and ask questions.

Add our 1B2A Seminars and Events Calendar to stay up to date with events at York University.

Neuroscience Society at York University:



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A Grateful Thank You

This month's article, and the newsletter itself, would not have been made possible without the help of the following intelligent, talented, and passionate individuals who have dedicated time to present their original work and support the development of this month's issue. If you are interested in joining our team as we develop our issues for April 2026 and further, please click at the google form link attached below. Members of all disciplines and backgrounds are welcome to take part in this initiative.

Anthony Adams | Author
Denz Marieon Pasion | *Head of Photography*
Dr. Brian Corneil | *Featured CVR Lecturer*
Dr. Claude Alain | *Featured Research*
Dr. David Brainard | *Featured CVR Lecturer*
Dr. Jeffrey Schall | *Interviewee*
Dr. Peter Kohler | *Supervising Staff Faculty*
Dr. Virginia Penhune | *Featured CIAN Lecturer*
Hana Sopel-Mizrahi | *Founder* | *Editor* | *Author* | *Head of Interviews*
Jana Alagha | *Head Editor* | *Author* | *Interviewer*
Kristen Lott | *Interviewee*
Lana Putros | *Visual Media Designer*
Nicole Pitkis | *Head of Visual Media Design* | *Editor* | *Author*
Valentina Dodaro | *Head of Seminars and Events*

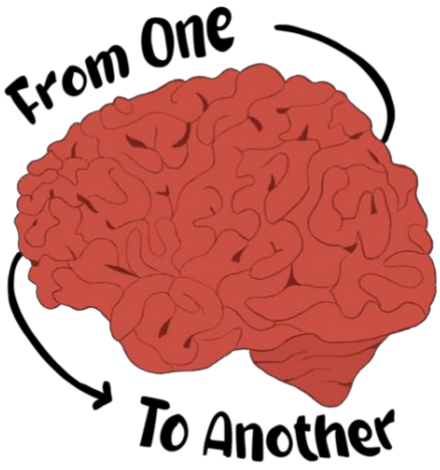


Illustration illustrated by Lana Petros.

Cover Page illustrated by Nicole Pitkis.

Logo designed by Nicole Pitkis.

CVR Seminar Photography captured by Denz Marieon Pasion

Neuroscience Society at YorkU Media illustrated by Allegra Favaretto

We are always welcoming **students who want to contribute** and **gain some volunteer/research experience**. If that's you, please fill out our **google form.**

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