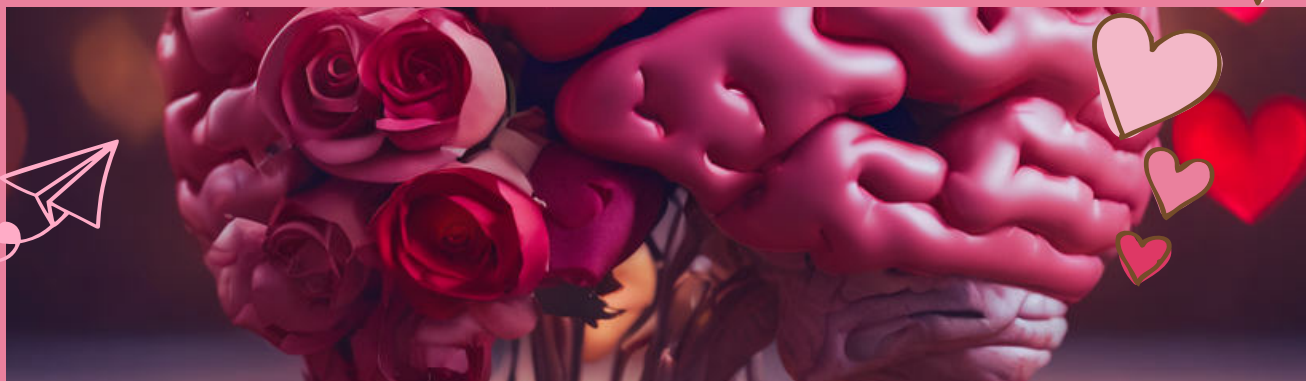


# THE BRAIN BLAST

## EDITION 6 - LOVE & SOCIAL BONDING

3/1/24  
UBC Undergraduate Program in Neuroscience Newsletter



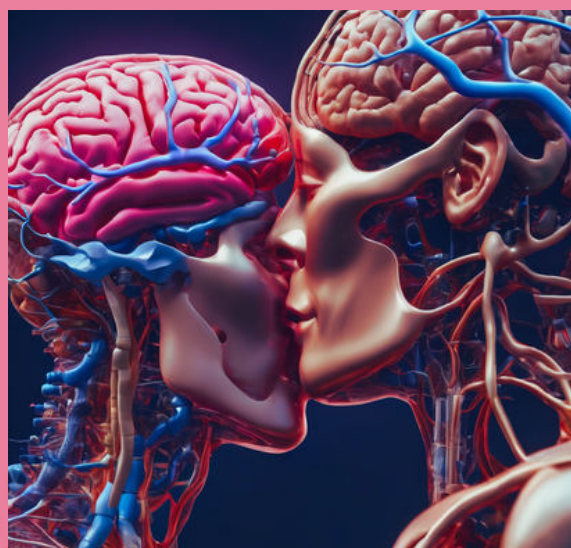
Welcome to the sixth edition of The Brain Blast! This month, we're talking all about love and social bonding. In this edition, we have a special interview with one neuroscience student talking about his lab, as well as if he recommends the program. We also have some cool new features this month, such as the Research Articles section and the sneak peak of NSCI 311.



### THIS MONTH'S THEME:

#### LOVE & SOCIAL BONDING

Be sure to fill out this month's development-themed polls and check out our responses from the last AI edition - this edition has some quite interesting results! From the insightful interviews, to labs of the month, this newsletter is packed with information that you don't want to miss, so go on and dig in!



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## THIS MONTH IN NSCI 201: FUNDAMENTALS OF BEHAVIOURAL AND COGNITIVE NEUROSCIENCE

February has been an exciting month for NSCI 201, we've had our first midterm and two guest speakers. With Dr. Soma, we've looked at various behaviours, including feeding, reproduction, parenting, and social behaviour. Our first guest speaker was Dr. Shelly McErlane, a UBC veterinarian specializing in the care of research animals. We went over ethics in animal research, and how to care for animals as a researcher. Distress is not always intuitive in specific animals, for example, some rats do continuous backflips when stressed! We also had Michelle Hunsche give a talk on Autism Spectrum Disorder. It was interesting to hear that ASD is more prevalent in males than females, but it is unclear if this effect is a result of it being harder to diagnose ASD in females.

## THIS MONTH IN NSCI 301: NEUROSCIENCE, ETHICS AND SOCIETY

We started off the month with another quiz! Afterwards, we had a lecture on psychiatric diagnosis, exploring the history and ethical implications of tools like the DSM and RDoc. Our reading for the week discussed the implications of using AI language analysis technology for psychiatric diagnosis, and our tutorial was a group discussion of a hypothetical case study. The next week, Dr. Tanya Barretto introduced us to the complexities of treating spinal cord injury, discussing the intricacies of SCI pathophysiology, challenges in SCI clinical trials, and emerging SCI treatments. Also, we completed our first midterm (great work everyone!). To end off the month, Kat Kabacińska gave us a guest lecture on robot ethics and their implications, where we critiqued existing social robots then designed our own!

## THE NEURO REVIEW @ UBC

## THIS MONTH IN PSYC 371: BEHAVIOURAL NEUROSCIENCE II

We finished off the last few slides on motor cortex plasticity, before diving right into other forms of learning that complement the memory systems we covered in PSYC 370. We began with the fronto-striatal circuits, exploring how movement is facilitated via the direct and indirect pathways, and how movement is affected in disorders like Parkinson's and Huntington's when these circuits are damaged. Dr. Snyder emphasized the important role of dopamine, and how although it is often thought of as the 'reward hormone', its role lies more in appetitive motivation, critical for understanding addiction behaviours. We contrasted striatal and hippocampal learning, through experiments like the reversal learning task, plus maze, and water maze. Finally, we looked into the role of the amygdala in innate fear responses and assigning valence to stimuli, but also in modulation of emotional memories such as in the conditioned taste aversion experiment

## THIS MONTH IN BIOL 372: PRINCIPLES OF NEUROBIOLOGY II

We started off the month by learning about the visual system. Some of the main topics included the signal transduction pathway, the differences between rods and cones, as well as the receptive field and the pathway involved in the light difference between the centre and surround. After this, we had our first midterm for the class, on somatosensation, audition and vision. During the latter part of the month, we focused on the other sensory modalities that we haven't touched upon yet: olfaction and gestation. We found out that, in comparison to the continuous representation we saw in the other sensory modalities we had learned previously, olfaction and gustation have discrete representations resulting in less organization. We also found out that there are many differences between tastes and smells, as with taste, you only get specific types of modalities, while for smell, you are able to smell trillions of different chemicals!



## SPOTLIGHT

### KYLER, TELL US A LITTLE BIT ABOUT YOURSELF

I'm Kyler Cyna, a third year neuroscience undergraduate student specializing in the cognitive/behavioral stream, and I'm currently planning to go to grad school in a year - which I didn't really realize until right now. I'm really passionate about the underlying neural basis of memory and decision making.

### WHY DID YOU WANT TO BE A PART OF THE WINSTANLEY LAB?

During one of the grad student presentations in NSCI 201, there was one that particularly grabbed my attention. Not only did the presenter talk about weed vape chambers, which was really interesting, but also touched on the intricacies of decision-making and impulsivity. This is precisely why I'm passionate about neuroscience – delving into the mysteries behind my own behavior, unraveling the complexities of why I act the way I do. It's the million-dollar question that drives me. Known among my friends as someone who acts on impulse without much forethought, I'm eager to uncover the mechanisms behind decision-making. The Winstanley Lab stands out as one of the most remarkable labs I've encountered, with an array of innovative research methods (like pioneering the rat gambling task) and super interesting studies that are investigating decision making.

### AT THE LAB, WHAT IS ARE SOME THINGS THAT YOU HAVE LEARNED THAT HAVE BEGAN TO INTEREST YOU?

In my directed studies, my primary task has involved placing rats in operant boxes. Initially, I wasn't a fan of rats, but they've grown on me over time (except for #22, she's downright evil). These operant boxes utilize the cued rat gambling task, and over the past four months, the rats have become adept gamblers. Now, we're delving into the heart of the experiment, manipulating its core purpose (delayed discounting - seeing if the rat's decisions will be impacted by needing to wait longer for certain options). Observing the project progress and witnessing the puzzle pieces fall into place brings me indescribable joy. Every step forward holds meaning, and there's a sense of fulfillment in understanding the purpose behind why each action is done, which is not something I had anticipated when I started research.

I had to do a lot of research recently for my NSERC proposal, which despite giving my basolateral amygdala trauma over the basolateral amygdala was incredibly enlightening for why certain experiments are chosen to be done to better understand certain unexplored aspects, while still going off of the basis of knowledge we have, something I've never fully understood before. I've also gotten to do drug injections, anesthesia, some cryostat (brain slicing), soon hopefully some surgeries, and it is all so interesting. It's not always fun, but it's undeniably engrossing.



## **WHAT IS ONE PIECE OF ADVICE YOU WISH YOU WOULD'VE KNOWN BEFORE GETTING INTO RESEARCH?**

It is fun, and it is terrifying. You'll find yourself facing challenges you never anticipated, and sometimes, you just have to fake confidence until you make it. The first time I held a rat? Absolutely terrifying. It took me weeks to acclimate, while everyone else seemed born ready. The initial experience of extracting a brain from a rat skull, mere minutes after holding it, left me shaken for days. But, for better or worse, it gets easier over time. We're far more resilient than we give ourselves credit for; it just takes time.

## **OUTSIDE OF THE LAB, WHAT TYPE OF THINGS DO YOU LIKE TO DO THAT KEEP YOUR LIFE BALANCED?**

For fun, I really like animating/making videos, building robots that either break down or decide to go out with a bang (literally - I need to invest in better batteries), go on hikes, although I've turned it into a sport of getting monumentally lost, and slowly damaging my spinal cord playing volleyball. It's hard to keep life balanced, I am notoriously bad at it, which is why I have friends who peer pressure me out of the bubble of work - which has actually led to me doing way better in school. Balance is important, burnout is bad - common sense that I often forget.

## **WOULD YOU RECOMMEND THE NEUROSCIENCE PROGRAM TO OTHER STUDENTS AND WHY?**

Honestly, I'm probably the last person you should ask because my joy of neuroscience goes way beyond what's considered normal. But seriously, I highly recommend it. Neuroscience is absolutely fascinating. It's not just some abstract concept; it's something you can apply to your everyday life. You might find yourself doing something and suddenly realize, "Ah, this is why I'm doing it!" That "aha" moment is like chicken soup for the soul. Neuroscience is both logical and mysterious, and that's precisely why I'm drawn to it. We're on the brink of a neuroscience revolution, and there's no better time than now to dive in headfirst.

Author: Dalmar Yusef  
Editor: Jannah Cruz  
Designer: Alyanna Llavore

# CRANIAL NERVE STIMULATION

& THE HYPOGLOSSAL NERVE

## I can't stop thinking about the magical world of cranial nerve stimulation (CNS)!

Last time, we talked about how the trigeminal nerve (CN V) improved recovery in coma patients. Because CNS is just so cool, and because this time of year has me missing and needing a good night's sleep, I'll take you on a journey to hypoglossal-ville. For those not in NSCI 311, the last (and certainly not least) cranial nerve is the hypoglossal nerve (CN VII). Unlike the trigeminal nerve, the hypoglossal nerve only carries motor modalities, which innervate the tongue muscles. Compared to CN V, the hypoglossal nerve doesn't get enough attention, especially when it plays such a big role in helping us sleep peacefully!

But why is the tongue important for the quality of sleep? Almost one billion people are estimated to have obstructive sleep apnea (OSA). OSA is a chronic condition characterized by a complete (apnea) or partial (hypopnea) collapse of the airway during sleep. Besides difficulty in sleeping, chronic sleep disruption/deprivation has some severe cardiovascular implications, among other things. The traditional therapy for sleep apnea is called PAP, or positive airway pressure. PAP therapies work by maintaining proper posture of the airway to prevent collapse. However, the tangle of masks and tubes used for PAP is uncomfortable, making it difficult for patients to adhere to treatment.



# RHYTHM AS THERAPY:



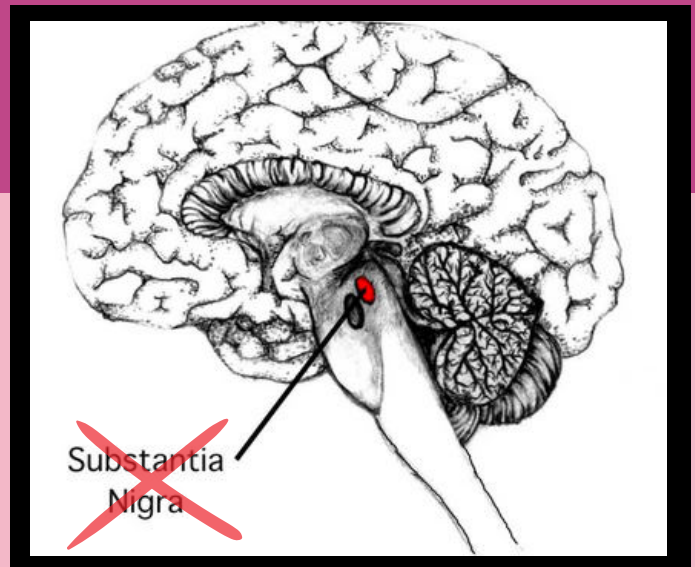
# MOVING TO THE BEAT



Author: Gael Hernandez Palmer  
Editor: Elise Wong  
Designer: Chenyi Su  
Undergraduate Program in Neuroscience  
University of British Columbia

## Parkinson's Disease (PD)

is characterized by bradykinesia (slowed, and disturbed motor patterns) and gait disturbances which lead to an increased risk of falls. Given the limitations of available medications for PD, significant efforts have been made to integrate nonpharmacologic interventions into patients' regimens. One such intervention is Rhythmic Auditory Stimulation (RAS), a neurological music therapy technique developed in the late 1990s which uses rhythmic cues to entrain gait in patients with movement disorders. RAS has been shown to be effective in improving stride length, gait velocity, and cadence in PD patients (Thaut et al., 1996), and reducing their risk of falls (Thaut et al., 2019). This may seem intuitive—it is not uncommon for most people to walk on beat while listening to music – so why do PD patients show such a marked improvement in gait?



## BASIS OF THE RAS



PD disrupts corticostriatal systems involved in the facilitation of motor patterns (Magrinelli et al., 2016) and decreases the activity of the putamen, which is involved in processing rhythmic stimuli and generating an internal beat (Nombela et al., 2013). Corticostriatal deficits appear to disrupt aspects of gait, such as timing and movement initiation. Still, externally cued movements seem to be less difficult for PD patients, thus forming the basis of the RAS technique.



## A RELATED STUDY

Braunlich et al. investigated the neural mechanisms underlying the RAS technique (2019). They recruited both PD patients and healthy controls to undergo a finger-tapping paradigm at various speeds with and without RAS. Participants were evaluated for “freezing,” a PD-related behavioural phenomenon in which individuals' initiation of movement is delayed.



# RHYTHM AS THERAPY:



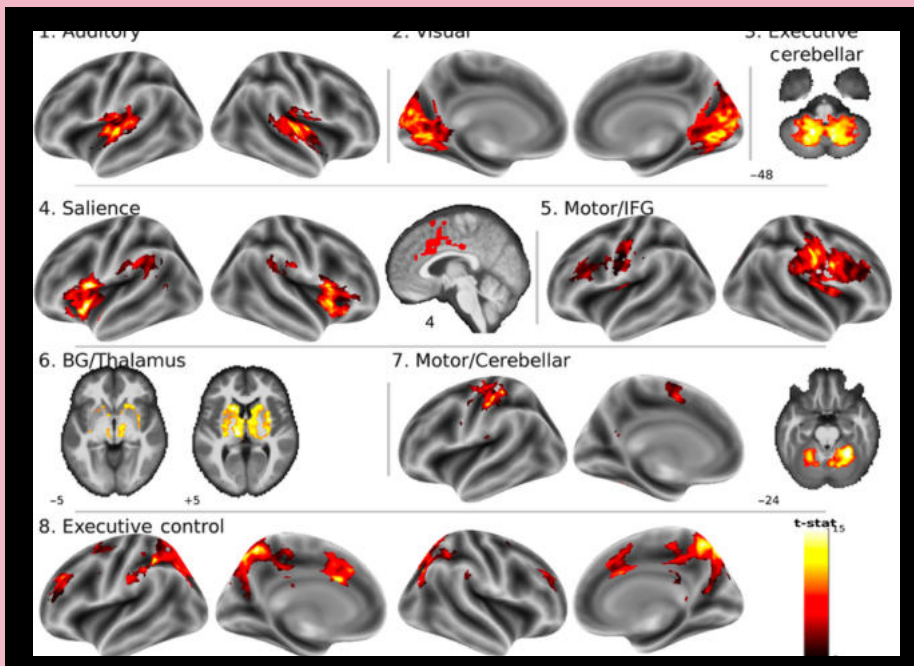
## MOVING TO THE BEAT

### Central Findings



Braunlich and his colleagues' findings were consistent with previous studies examining RAS on freezing behaviours; RAS significantly reduced freezing behaviours in PD patients, and there was a stronger effect on freezing during the rapid-tapping speed.

However, the findings of the study did not prove the researchers' hypothesis – that RAS would have a direct effect on corticostriatal or corticocerebellar systems. Although, their findings did but still elucidated a potential mechanism by which RAS acts on the PD brain to improve gait.



The authors note that the observed increased frontoparietal connectivity, one of the central findings of their study, could be compensating for lost corticostriatal function, allowing those networks to influence motor function more heavily, and facilitating the gait-related complex movements.

### Why Important?

These findings are a large step towards understanding how RAS truly works to improve gait in PD patients. Furthermore, they highlight the importance of nonpharmaceutical therapies research to address the motor, cognitive, and psychiatric symptoms of PD patients.



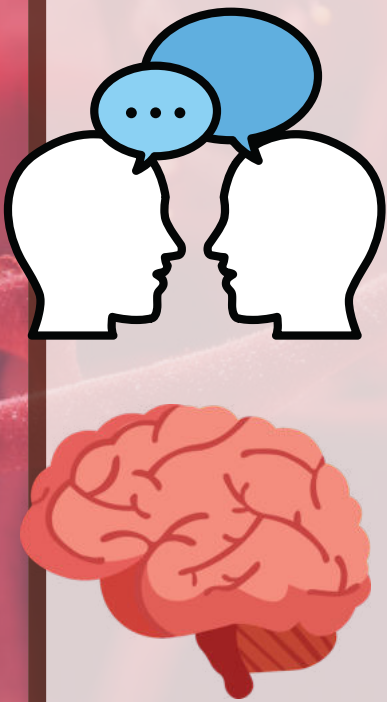




Dive into this month's research article, on reconstructing intelligible speech from the human auditory cortex

## “TOWARDS RECONSTRUCTING INTELLIGIBLE SPEECH FROM THE HUMAN AUDITORY CORTEX”

Picture a scene out of a science fiction novel, where it is possible to communicate with another simply through a thought. This seemingly farfetched idea may be closer to reality than imagined, with current research on auditory stimulus reconstruction. This technique aims to reconstruct an approximation of an acoustic stimulus based on neural activity. Such a technology would have huge implications for those who have lost the ability to speak, including those with “locked-in syndrome” or paralysis.



Previous research on this topic has been hopeful but the quality of speech produced from these signals remains low. This article combined some of the latest research on machine learning and speech synthesis technology, to build a more accurate model. To gather the neural response data, they implanted invasive electrocortigraphy into five patients undergoing neurosurgical treatment for epilepsy. Patients listened to a story to keep them attentive and were asked to repeat certain sentences during the story, from which neural activity was recorded and used in a machine learning model.

## DR. CATHARINE WINSTANLEY



The Laboratory of Molecular and Behavioural Neuroscience explores the neural, neurochemical and molecular basis of higher-order cognitive processes such as impulse control and gambling. Dr. Winstanley's research aims to better understand the biological mechanisms underlying impulsivity to inform future treatments for psychiatric disorders like treatments for psychiatric disorders such as attention-deficit hyperactivity disorder, bipolar disorder, and drug addiction where impulse control is implicated,

# NEUROSCIENCE LABS OF THE MONTH

## DR. JESSICA L. TRACY

The Emotion and Self Lab, directed by Dr. Jessica L. Tracy focuses on a variety of research topics including the evolutionary and psychological functions of emotional behaviours. A lot of the research done at the lab explores areas where self meets functions using specific techniques including behavioural observations, coding, social and cognitive techniques and physiological assessments. All and all, Dr. Tracy and her team strive to understand and answer questioned based on self and emotions.

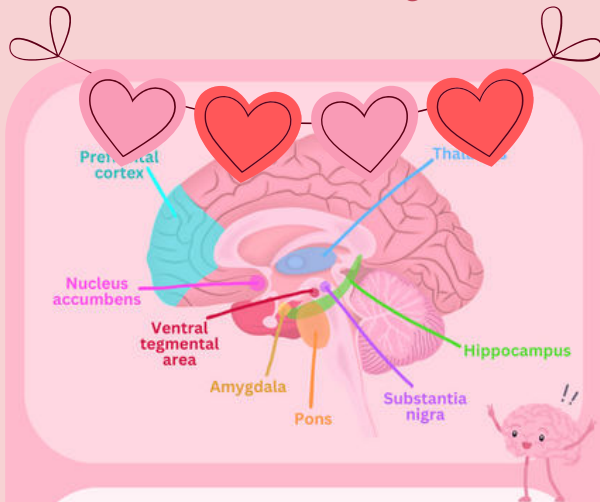


# PROJECT SPOTLIGHT: NSCI 311

## *Love and Neuroplasticity*

JAVEN SANDHU, SOPHIE PANTEL, MEGAN HEW, RAHUL NAIR, SAM CHEE, LIA SAYERS, ZAINAB ZEYAN, HRIDAY SAHNI

Have you every wondered how your brain changes when you're in love? Well look no further! Students in NSCI 311: Advanced Neuroanatomy created an interactive trivia game to teach you all about the brain regions and neurotransmitters involved with 'Love on the Brain'.






### *Love on the Brain*

#### *Trivia Card Game!*

#### *How to Play*

1. The host asks the players to pick a category.
2. The host picks a card from the selected category and reads the question out loud.
3. The players must buzz in! First player to buzz gets to answer!
4. If that player answers incorrectly, the other player has a chance to steal the points!
5. The player or team with the most right answers at the end wins!

#### *Question Categories*

- True or False? 
- Choice Overload 
- Can you beat the bot? 



Which neurotransmitter/hormone is most strongly connected to love?

- a) estrogen
- b) amoricin
- c) oxytocin
- d) serotonin



True or False?  
Love affects brain structures located closer to the outside/top of the brain



The ventral tegmental area (VTA) has been found to be affected by love. What is the VTA's main function?

- a) emotions like anger and fear
- b) regulating reward
- c) regulating breathing
- d) planning for the future



What function uses a similar pathway/ structures as love?

- a) addiction
- b) anxiety
- c) language
- d) object recognition



For this project, students worked collaboratively throughout the term exploring the neuroanatomy behind topics like love, meditation, alcohol, and the aging brain. Final projects were presented at the final class or at the 'Neuroscience Carnival', where students had the opportunity to visit different project 'booths' - playing games, winning prizes, and meeting new classmates!

**WANT TO SEE MORE?**  
VIEW THE REST OF THE PROJECT BELOW!

[trivia cards](#)  
[infographic](#)

# EVENTS OF THE MONTH

## FEBRUARY'S NEUROSCIENCE RESEARCH COLLOQUIUM

MAR 8

Dr. Nick Steinmetz:  
Brain-wide coordinated dynamics and Neuropixels Ultra.

MAR 15

Dr. David Holtzman:  
The role of APOE and the immune response in amyloid-induced tauopathy and tau-mediated neurodegeneration

MAR 22

Dr. Alicia Izquierdo:  
Translational models of frontocortical circuits in learning and decision making

APR 5

Dr. Kaarina Kowalec:  
Depression polygenicity and its association with multiple sclerosis disease activity and progression

## NEUROSCIENCE UNDERGRADUATE RESEARCH CONFERENCE:

DATE:

MAR 23  
12-6pm

NURC 2024 is in commence! 🧠💡 This year, we have 50 undergraduate students presenting their amazing research work in amazing neuroscience labs! ✨

NURC has previously attracted over 200+ attendees and includes keynote speakers and workshops. Additionally, graduate students, postdocs, and PIs will be attending. This is an amazing chance to ask them about their amazing research work, and to see how you can get involved! Lunch provided!

For more details see:

RSVP

# Results: January Student Polls

FILL OUT  
NEXT MONTHS  
POLLS  
**HERE!!**

## WHO IS YOUR CELEBRITH CRUSH?



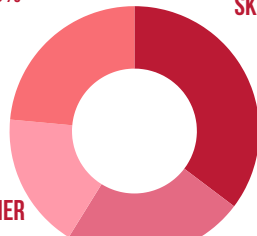
On Valentine's Day what would you rather do with your significant other?

NO SIGNIFICANT OTHER WAH WAH  
23.5%

SKATING AT ROBSON SQUARE  
35.3%

GO OUT FOR DINNER  
17.6%

GO TO THE MOVIES  
23.5%

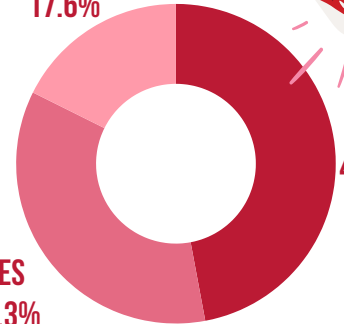


Do you like Adele?

YEP  
17.6%

YEAH  
47.1%

YES  
35.3%



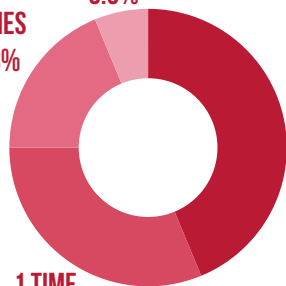
How many times have you been in love?

2 TIMES  
18.8%

3 TIMES  
6.3%

0 TIMES  
43.8%

1 TIME  
31.3%



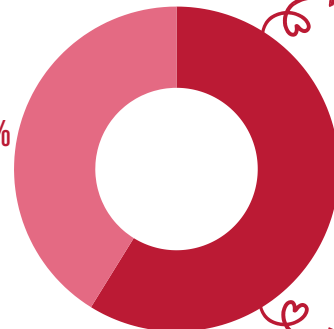
Do you believe love at first sight is real?

NO  
41.2%

I THINK SO BUT IM NOT 100% CAUSE IVE NEVER EXPERIENCED IT BEFORE BUT I FEEL LIKE I COULD

YES  
58.8%

IN A PERFECT WORLD..



# Results: January Student Polls

FILL OUT  
NEXT MONTHS  
POLLS  
HERE!!



## WHAT IS YOUR FAVOURITE LOVE SONG?



**THE LOUVRE**  
LORDE  
⏮ ⏪ ⏩ ⏭



**SEASONS**  
WAVE TO EARTH  
⏮ ⏪ ⏩ ⏭



**IRIS**  
THE GOO GOO DOLLS  
⏮ ⏪ ⏩ ⏭



**EVERYTHING**  
THE BLACK SKIRTS  
⏮ ⏪ ⏩ ⏭



**I FALL IN LOVE  
TOO EASILY**  
⏮ ⏪ ⏩ ⏭



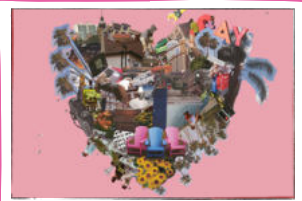
**LOVE ME AGAIN**  
V  
⏮ ⏪ ⏩ ⏭



**YOU WERE GOOD TO ME**  
JEREMY ZUCKER  
⏮ ⏪ ⏩ ⏭



**LOVE SCARS**  
TRIPPIE REDD  
⏮ ⏪ ⏩ ⏭



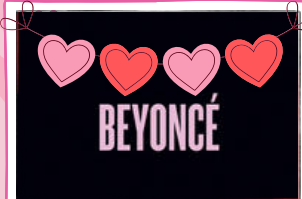
**WAR-R-R**  
COLDE  
⏮ ⏪ ⏩ ⏭



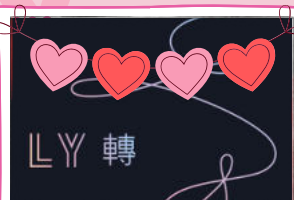
**MY KIND OF WOMAN**  
MAC DEMARCO  
⏮ ⏪ ⏩ ⏭



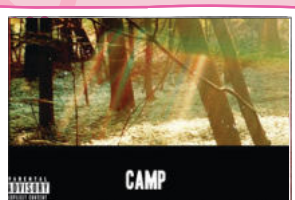
**SHE THINKS MY  
TRACTOR'S SEXY**  
⏮ ⏪ ⏩ ⏭



**DRUNK IN LOVE**  
BEYONCE  
⏮ ⏪ ⏩ ⏭



**LOVE MAZE**  
BTS  
⏮ ⏪ ⏩ ⏭



**HEARTBEAT**  
CHILDISH GAMBINO  
⏮ ⏪ ⏩ ⏭



**PAPER BAG**  
FIONA APPLE  
⏮ ⏪ ⏩ ⏭



**LINGER**  
THE CRANBERRIES  
⏮ ⏪ ⏩ ⏭



## GET TO KNOW YOUR NEUROSCIENCE PEERS!

fill out our

### NEUROSCIENCE STUDENT POLLS

## THANKS FOR READING!

Do you have any questions, feedback, or suggestions about the Neuroscience Newsletter or the Neuroscience Program? Want to be featured in the next Neuroscience Newsletter?

LET US KNOW IN THE NEUROSCIENCE NEWSLETTER FEEDBACK FORM

### OFFICE HOURS: RYAN BOUMA

If you have any program-related questions, please direct them to Ryan, the program advisor at [advising@neuro.ubc.ca](mailto:advising@neuro.ubc.ca)

### RESOURCES:

WELLNESS RESOURCES

SEXUAL ASSAULT RESOURCES

EQUITY/HUMAN RIGHTS  
RESOURCES

THE NEUROSCIENCE  
RESEARCH BAY

WRITTEN AND DESIGNED BY  
SHARON SHRESTHA  
MEGAN HEW  
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### References

